



United States
Department of
Agriculture

Forest
Service

Southwestern
Region



Environmental Assessment for Angostura Allotment

Carson National Forest

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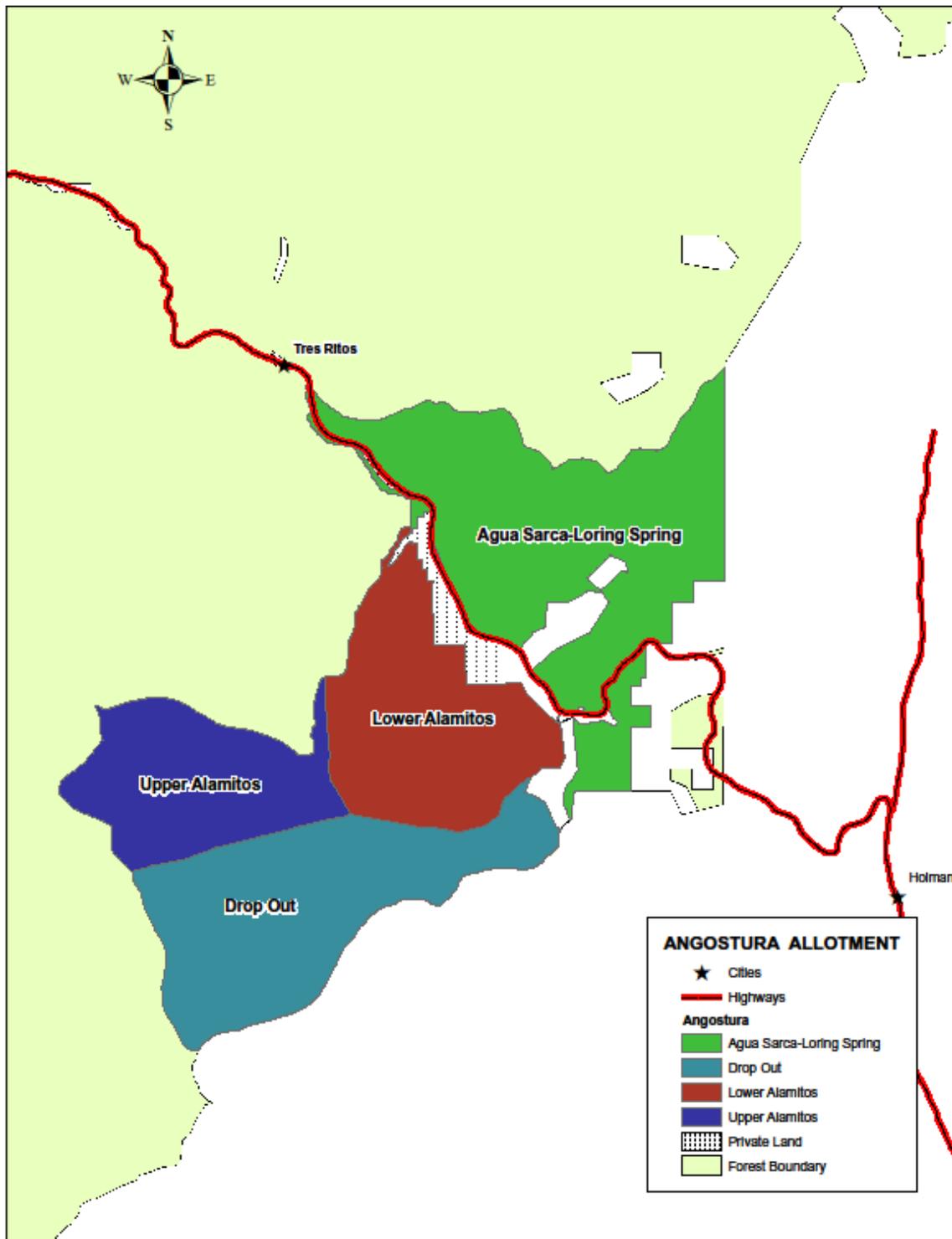


Figure 1. Angostura Allotment boundary with pastures

Chapter 1 – Purpose and Need

The Forest Service has prepared this environmental assessment (EA) in compliance with the National Environmental Policy Act (NEPA) of 1969 and other relevant Federal and State laws and regulations. This EA discloses the direct, indirect, and cumulative environmental impacts that would result from the implementation of the proposed action and alternatives, and considers the best available science. An interdisciplinary analysis on the proposed action is documented in a project record. Source documents from the project record are incorporated by reference throughout this EA by showing the document number in brackets [#]. This EA summarizes the project record to make the analysis results as clear as possible. Additionally, comments received during a 30-day comment period (as required by the Forest Service's 36 CFR 215 notice, comment, and appeal regulations) were considered by the specialists in finalizing the proposed action and their effects analyses.

Background

The Angostura allotment is located on the southeastern edge of the Camino Real Ranger District of the Carson National Forest in Taos, Rio Arriba, and Mora counties, New Mexico. The four pastures that make up the allotment are located to the northeast and southwest of State Highway 518, east of the community of Tres Ritos and west of the community of Holman. It can be accessed by State Highway 518, and Forest Roads 722 and 161. The allotment contains approximately 17,716 acres. Currently the allotment is managed through three individual term grazing permits authorizing a total of 85 cow/calf pairs, with a grazing season of June 1 to September 30. In addition, there is a single term grazing permit issued to the Angostura de Caballos Grazing Association to graze four bulls on the allotment for the same season. The three individual permittees form the above grazing association.

Management involves a four-pasture, deferred-rotation grazing system. The four pastures are the Agua Sarca/Loring Spring, Lower Alamos, Upper Alamos, and Drop Out pastures. The association members run their cattle together as one herd. The western portion of the allotment within the Upper Alamos and Drop Out pastures is located within the Pecos Wilderness Area. The entry pasture is alternated each year. Cattle are trailed from pasture to pasture, with each move usually taking 1-2 days. Livestock are typically scheduled to spend about 1 month in each pasture. An association member visits the allotment nearly every day during the grazing season.

Purpose and Need for Action

The Angostura Allotment contains land that is considered suitable for grazing in the Carson National Forest Land and Resource Management Plan (forest plan, USDA 1986). When continued use is consistent with the goals, objectives, standards, and guidelines of the forest plan, it is Forest Service policy to make forage available to qualified livestock operators from lands suitable for grazing (Forest Service Manual (FSM) 2203.1.6). The purpose of the proposed action is to authorize livestock grazing in a manner that balances permitted use with Forest Plan objectives, and desired conditions for rangeland vegetation, soil, watershed, and wildlife habitat.

There is a need for improving livestock management in the vicinity of Loring Spring and Agua Sarca Spring where current infrastructure (i.e. spring protection fences) is inadequate to control livestock movement and there is a need to maintain meadow and forested-openings across the allotment. There is a need for forage availability to support domestic livestock and contribute to the economic diversity and social well-being of surrounding communities that depend on range resources for their livelihood.

Proposed Action

Table 1 outlines the purpose and need, the actions proposed to achieve the purpose and need, and allotment management objectives.

Table 1. Purpose and Need and Proposed Action

Pasture	Proposed Action	Purpose and Need	Objective
Angostura Allotment	Authorize 76-85 cow/calf units and 4 bulls to continue grazing on the Angostura Allotment, utilizing a four-pasture rotational grazing system within the season 6/1-9/30.	<p>Livestock grazing on National Forest System lands has contributed to the local economy and the stability of northern New Mexico communities for over a hundred years. On the Angostura Allotment, there is a need for forage availability to support domestic livestock and contribute to the economic diversity and social well being of surrounding communities that depend on range resources for their livelihood.</p> <p>Capacity studies have determined that the Angostura Allotment can support up to 89 cow/calves + bulls and achieve desired conditions and range readiness studies have determined that the allotment is often range ready by June 1st. A realistic stocking range is 80-89, to make adjustments for drought years.</p>	<p><u>Make forage available to support domestic livestock and contribute to the economic diversity and social well being of surrounding communities that depend on range resources for their livelihood.</u></p> <p><u>Maintain or improve range vegetation and soil conditions.</u></p>
Agua Sarca-Loring Spring Pasture	Enhance riparian conditions around developed springs by moving drinkers out of riparian areas onto drier sites (Loring and Agua Sarca springs). Schedule limited grazing within the Agua Sarca area to achieve resource goals. This may require additional herding and salting by the permittees to achieve.	Loring and Agua Sarca Springs are developed springs with drinkers for livestock and wildlife. The size and condition of the spring protection fences and the location of the drinkers can be modified to better protect the condition of riparian vegetation in those areas. More intensive management of livestock (herding) in the relatively narrow Agua Sarca Spring area is needed to ensure	<u>Provide for more effective management of cattle.</u>

Pasture	Proposed Action	Purpose and Need	Objective
		livestock do not linger and cause degradation to the soils and vegetation. Loring Spring is much more open with large meadows which allow for better distribution of livestock. Current management is adequate in this area.	
Angostura Allotment	Implement prescribed burning within approximately 789 acres within grassland meadows and old timber sales at a low to moderate intensity using broadcast burning, with possible hand piling and pile burning. The 789 acres are in the following vegetation types: grass - 62 acres, Gambel oak – 53 acres, aspen – 64 acres, Douglas-fir – 84 acres, and spruce fir – 525 acres. These areas all have slopes of less than 40% and are relatively open, having less than 60% canopy cover. The intent is to implement prescribed burns within meadows and openings, not within the densely forested areas. Timing of burns would occur during fall, summer or winter, with fall ignition being most likely. Riparian buffers would include 50 feet around seeps, springs, wetlands, and intermittent streams; 100 feet around perennial water.	Across the western landscape, it has been recognized that meadows and open tree canopy areas have been steadily disappearing as more dense forests have been expanding. This has, in part, been a result of a century of fire suppression. There are meadows and open forest areas within the Angostura Allotment which support herbaceous vegetation which provides food for both livestock and numerous species of wildlife. As these areas become encroached with trees and as open forest areas become denser, reducing sunlight to the forest floor, the growth and diversity of herbaceous vegetation in these areas is often reduced.	<u>Maintain/enhance meadows and forested openings to maintain or improve productivity of the herbaceous vegetation and the overall fire regime condition classes¹.</u>

Decision Framework

Given the purpose and need, the deciding official reviews the proposed action and the other alternatives. The Camino Real District Ranger is the Responsible Official for this proposal. For authorizing livestock grazing on the Angostura Allotment, there is a four-part decision at the project level to be made:

- Determine whether livestock grazing will be authorized on all, part, or none of the Angostura Allotment.

¹ Fire Regime Condition Class is a classification of the amount current conditions have departed from those of historical reference conditions.

- If the decision is to authorize some level of livestock grazing, then identify what management criteria will be applied (including guidelines, grazing management system, and monitoring) and incorporated into the allotment management plan. Ensure that desired range condition objectives are met, or movement occurs toward those objectives within the duration of the permit.
- Determine whether prescribed burning will be authorized on part or none of the Angostura Allotment.
- If the decision is to authorize some level of prescribed burning, then identify which of the proposed 789 acres within the Angostura Allotment would be prescribed burned to meet resource objectives.

Public Involvement

The proposal has been listed in the Carson National Forest Schedule of Proposed Actions since July 2007. The proposal was provided to the public and other agencies for comment during a 30-day scoping period beginning on December 21, 2007. A total of nine responses were received. Permittees participated in the planning process by attending meetings with the district. Using public responses, issues were identified and alternatives were developed to address these issues. The alternatives were provided to the public during a 30-day notice and comment period beginning on August 7, 2008. A legal notice of availability was published in The Taos News in accordance with 36 CFR 215.5(b). A total of 17 responses were received.

Issues

Public involvement is used to identify issues to be addressed in the proposed action. Comments received during the scoping process were examined by the Forest Service specialists for issues to address. The Forest Service separates issues into two groups: significant and non-significant issues.

Significant issues are defined as those directly or indirectly caused by implementing the proposed action. Non-significant issues were identified as those: 1) outside the scope of the proposed action; 2) already decided by law, regulation, Forest Plan, or other higher level decision; 3) irrelevant to the decision to be made; or 4) conjectural and not supported by scientific or factual evidence. The Council for Environmental Quality (CEQ) NEPA regulations require this delineation in 40 CFR 1501.7 "...identify and eliminate from detailed study the issues which are not significant or which have been covered by prior environmental review (Sec. 1506.3)..." The Forest Service identified two significant issues during scoping, which are:

1. Prescribed burning poses a risk of escape – Mitigation measures to minimize this risk are identified in a burn plan. This would be developed prior to any implementation. It would identify the resources needed and the parameters under which the burn would be conducted to achieve resource goals and to reduce risk of escape.
2. Rio Grande cutthroat trout may be negatively affected by livestock grazing in the vicinity of trout streams. Proposed grazing guidelines of 40% utilization, 4" stubble heights, following rotational grazing systems, and salting away from waters would help protect Rio Grande cutthroat trout. Effects to Rio Grande cutthroat trout will be the indicator of this effect.

Chapter 2 - Alternatives

This chapter describes and compares the alternatives considered for the Angostura analysis. The alternative comparison defines the differences between each alternative and provides a clear basis for choice among options by the decision maker and the public. The information used to compare the alternatives is based upon the environmental, social, and economic effects of implementing each alternative. The no action alternative of no grazing must be addressed in the analysis as required by the CEQ regulations for implementing NEPA (40 CFR 1502.14).

Alternatives Considered, but Eliminated from Detailed Analysis

Federal agencies are required by NEPA to rigorously explore and objectively evaluate all reasonable alternatives and to briefly discuss the reasons for eliminating any alternatives that were not developed in detail (40 CFR 1502.14). Public comments received in response to the proposed action provided suggestions for alternate methods for achieving the purpose and need. Some of these alternatives may have been outside the scope of the need for improving livestock management in the vicinity of Loring Spring and Agua Sarca Spring where current infrastructure (ie. spring protection fences) is inadequate to control livestock movement and the need to maintain meadow and forested-openings across the Angostura Allotment, therefore a number of alternatives were considered but eliminated from detailed analysis.

Current Permitted Management

This alternative would have authorized grazing as it is currently permitted, with no additional structural or vegetation improvements. The interdisciplinary team (IDT) determined that while the allotment is currently in good to excellent range condition with a stable trend, the size and condition of the spring protection fences and the location of the drinkers in the vicinity of Loring Spring and Agua Sarca Spring would not be met. In addition the IDT determined more intensive treatments, such as prescribed fire, would be needed to stabilize the trends in these areas. Without those improvements, it would be difficult to achieve resource goals, thus it is not a viable alternative.

Keep Current Permitted Livestock Numbers

An alternative was suggested which would keep the current permitted numbers as the only number authorized (vs. the range of numbers proposed in alternative B) because the allotment is in good condition and has the capacity to support the current numbers. This alternative differs from the current management alternative, in that there would be spring enhancement work and prescribed burning implemented. It differs from the proposed action alternative in that there would not be a range in the number of livestock permitted. The IDT determined that while there is capacity on the allotment to support the full numbers, the apparent drought cycle the area has been experiencing affects forage production in such a way that a range of permitted livestock numbers is more realistic. Since the current permitted numbers would be a part of the proposed action alternative, the effects of the two alternatives would be very similar. For these reasons, this alternative was eliminated from detailed analysis as a separate alternative.

Prohibit Prescribed Fire

This alternative would not meet the objective to maintain/enhance meadows and forested openings in order to maintain or improve productivity of the herbaceous vegetation within these areas and the overall fire regime condition classes. Across the landscape and within the analysis

area, open meadows are becoming scarce as small trees become established in these open areas. The habitat these meadows provide for wildlife and their prey is also becoming scarce across the landscape. Before any prescribed fire would be implemented, a burn plan would be developed, which would identify the resources needed and the parameters under which the burn would be conducted to achieve resource goals and to reduce risk of escape. The decision will include an analysis of if and where burning would be authorized. In addition, alternative A will analyze the effects of no burning.

Convert Dense Forested Areas to More Productive “Early Seral” Habitats

NMDG&F supported efforts to convert dense forested areas to more productive “early seral” habitats (grasses and forbs), noting that “prescribed fire is the most cost effective method to open closed forested areas and address conifer encroachment into meadows.”[32]

The IDT determined that the proposed action would partially implement this action, in proposing prescribed burns to maintain meadows and open forested areas. While the IDT recognizes that opening dense areas would be beneficial for herbaceous forage production for both livestock and grazing wildlife, the proposal to convert dense forested areas to “early seral” stages is out of the scope of this project. For this reason, an alternative which would convert dense forested areas to early seral habitats was eliminated from detailed analysis.

Alternatives Considered in Detail

Alternative A - No Action, No Grazing

Under the no action/no grazing alternative, domestic livestock grazing would not be a permitted activity on the allotment. Existing term grazing permits would be cancelled. The current permittees would no longer maintain existing range improvements (fences, spring developments, cattle guards, a “rain trap” water development, and two cattle guards). Maintenance or removal of these existing improvements would revert to the federal government or its cooperators.

Alternative B - Proposed Action

Livestock grazing would continue to be authorized on the Angostura Allotment, with some modifications, as follows:

- Authorize 76-85 cow/calf units and 4 bulls to continue grazing on the Angostura Allotment, utilizing a four-pasture rotational grazing system within the season 6/1-9/30.
- Enhance riparian conditions around developed springs by moving drinkers out of direct riparian areas onto drier sites (Loring and Agua Sarca springs). Schedule limited grazing within the Agua Sarca area to achieve resource goals. This may require additional herding and salting by the permittee.
- Implement prescribed burning within approximately 789 acres of the allotment at a low to moderate intensity using broadcast burning, with possible hand piling and burning, to maintain/enhance meadows and forested openings to maintain or improve productivity of the herbaceous vegetation and the overall fire regime condition classes. This would include approximately 62 acres in the grassland vegetation type, 54 acres in the Gambel oak vegetation type, 64 acres in the aspen vegetation type, 84 acres in the Douglas-fir vegetation

type, and 525 acres in the spruce fir vegetation type. The areas considered for prescribed burning would be in and around open meadows; in grasslands; in forested areas where canopy openings are at least 40% or greater (canopy cover of 60% or less); aspen patches; and/or any other openings – man-made or natural. The intent is to implement prescribed burns within meadows and openings, not within the densely forested areas or to change forest stand structure. Timing of burns would occur during fall, summer or winter with fall ignition being most likely. Riparian buffers would include 50 feet around seeps, springs, wetlands, and intermittent streams; 100 feet around perennial water.

Table 2. Comparison of Alternatives

	Alternative A	Alternative B
Permitted livestock	None	76-85 cow/calf pairs and 4 bulls
Season of use	None	6/1-9/30
Grazing management	N/A	4 pasture rotational. Schedule limited grazing within the Agua Sarca area to achieve resource goals. This may require additional herding and salting by the permittee to achieve.
New improvements	None	Enhance riparian conditions around developed springs by moving drinkers out of direct riparian areas onto drier sites (Loring and Agua Sarca springs). Approximately 789 acres prescribed fire in 62 acres of grassland meadows, 53 acres Gambel oak, 64 acres aspen, 84 acres Douglas-fir, and 525 acres spruce fir.

Mitigation Measures

To mitigate resource impacts, the following measures would be implemented under action alternatives. The mitigation measures included here are limited to those for which the Forest Service has authority. These mitigation measures have been used on previous projects and are considered to be effective in reducing environmental impacts. With full implementation of applicable Forest Plan standards and guidelines, project design criteria, and the prescribed mitigation measures, no potentially significant adverse environmental affects would be expected to occur.

Soil, Water and Vegetation – the objective is to safeguard water and soil resources under sustained forage production; manage sustained forage production and forage utilization by livestock while maintaining healthy ecosystems for all resource objectives. (Best Management Practices FSH 2509.22, Chapter 20, Range Management)

Control livestock numbers and season of use (i.e. evaluate range readiness, assure only permitted livestock enter the allotment, monitor grazing utilization, assess soil and vegetation condition and trend).

Control livestock distribution (i.e. salting, riding, existing fences and watering facilities).

Heritage Resources – the objective is to protect heritage resources (archaeological sites) from direct or indirect impacts caused by ground disturbing activities associated with the construction of range facilities.

If any unrecorded sites are discovered during the course of project implementation, all project activities in the vicinity of the site(s) would cease and the District or Forest Archaeologist would be notified. Project would be modified or relocated to avoid impacts to cultural resource sites.

Prescribe fire – the objective is to protect Mexican spotted owl (MSO) resources from direct or indirect impacts caused by prescribed burning activities.

To minimize any potential impacts to the MSO, new fence construction and prescribed fire within suitable MSO nesting habitat (protected and restricted habitat) would be done either outside the breeding season (March 1 to August 31), or would have protocol MSO surveys completed prior to implementation.

Monitoring

Monitoring informs the decision maker, specialists, and interested public of progress towards the goals and objectives during the implementation of a project. By monitoring the effects of actions and evaluating the results, appropriate modifications in management practices can be made, resource trends can be analyzed, and new knowledge can be applied to similar projects in the future. The following monitoring would apply to alternative B, if implemented.

Implementation monitoring would include periodic inspections to ensure compliance with term grazing permit terms and conditions. For example, range readiness would be monitored before the grazing season begins, stubble heights may be measured during the grazing season and utilization would be monitored at the end of the season. Effectiveness monitoring would determine if grazing standards and guidelines, grazing prescriptions, and Allotment Management Plan practices are effective in accomplishing the planned objectives. For example, vegetation condition and trend would be monitored at approximately ten-year intervals.

Summary of Effects by Alternative

This section provides a summary of the effects of implementing each alternative. Information in table 3 focuses on where effects can be distinguished quantitatively or qualitatively between alternatives. Further discussion of effects on resources by alternative can be found in Chapter 3.

Table 3. Comparison of Effects by Alternative

Resource	Alternative A	Alternative B
Range condition and trend	Most of the transitional rangelands are expected to fall into a stable or downward trend as woody vegetation increases. Graminoid plants would not be as vigorous, and species composition would change as the vegetation moves toward climax. Small isolated meadows surrounded by closed forest canopies would continue to	Burning of meadows and forest openings (5% of allotment) would reduce the encroachment of woody vegetation. 789 acres would be maintained as meadows and forested openings. Range condition in the burned areas would be expected to stabilize or slightly improve from fair to good, and good to excellent with upward and stable trends. Wildlife use would increase as well

Resource	Alternative A	Alternative B
	support wildlife grazing.	in the treated areas, relieving pressure on other areas in the allotment. In 95% of the allotment where burning does not occur, much of the encroachment would continue and some portions of the grazable range would move from good to fair range condition as that occurs.
Riparian wetland areas and stream channels	Effects of alternatives A and B to stream channels, stream-associated riparian-wetland areas and seep/spring-associated riparian-wetland areas would be similar, over the long term. The difference between alternatives would be the expected rate of change, with alternative A generally achieving riparian management objectives in a shorter time frame than alternative B, but measurable progress would be made within the life of the grazing permit. Properly functioning riparian-wetland areas exhibit the vegetation and structural components necessary to achieve management objectives.	
Water quality	The Rio Pueblo would continue to meet the fully supporting designated beneficial uses.	The Rio Pueblo would continue to meet the fully supporting designated beneficial uses. Repairing the Agua Sarca Spring fence and moving the drinker out of the riparian area would help to stabilize streambanks. The temporary loss of cover from prescribed burning would be compensated by increased vegetation ground cover during the next spring green-up or following the next rainfall. Low intensity, broadcast burning would scorch only the surface of the duff layer and is characteristically patchy in extent, leaving areas of unburned vegetation, to further trap sediment and slow runoff. In addition, ash or sediment delivery to channels would not be expected, because flowing streams are not present in or near the project area. The magnitude of the effects of fire on water quality is primarily driven by fire severity, and not necessarily by fire intensity. Use of prescribed fire allows the manager the opportunity to control the severity of the fire and to avoid creating large areas burned at high severity.
Floodplains	Floodplain function maintained under both alternatives.	
Air quality	Attainment status maintained.	Prevailing winds and normal ventilation would act to quickly disperse any dust generated from grazing activities. Since scale, scope, and duration of dust generating activities would be small and intermittent, air quality attainment status would not be lost due to livestock grazing. Prescribed burning could cause smoke management concerns, especially if smoke

Resource	Alternative A	Alternative B
		drifts into populated areas. Fire managers would abide by New Mexico Air Quality Bureau regulations and monitor the effects of smoke from prescribed burning.
Federally listed species – Mexican spotted owl	No impact to population or prey, and habitat quality improved.	No impact to population. Prey species diversity and habitat quality maintained or improved. No burning would occur within suitable spotted owl nesting habitat during the breeding season without protocol MSO surveys being completed.
FS sensitive species - Northern goshawk	No impact to population or prey, and habitat quality improved.	Improvement in livestock distribution would lead to adequate forage utilization levels and range condition to support goshawk habitat. Potential to impact individual goshawk, however, it would not have a measurable negative effect to their populations. Prey species diversity and habitat quality maintained or improved.
FS sensitive animal species - riparian or wetland habitat	No impact to population and foraging habitat improved.	Local grazing could occur along riparian zones, but impacts should be reduced with pasture rotation, limited grazing, relocating water sources out of riparian areas onto drier sites, range riders moving cattle around, and salting. Light to conservative grazing intensity (<40% utilization) would benefit riparian dependent species. Potential to impact individuals, but no measurable negative effect to their populations. Foraging habitat improved.
FS sensitive animal species - alpine tundra and high elevation coniferous forest	No impact to population. Foraging habitat improved.	Improvement in livestock distribution would lead to adequate forage utilization levels and range condition to support these species and their habitats in the long term. Prescribed burning would cause short-term disturbance to individuals; however burning would improve foraging habitat in the long term.
FS sensitive plant species - riparian and upland meadow habitat	Positive impact to population. Habitat improved.	Positive impact to population. Habitat improved.
FS sensitive plants species - open upland meadows habitat	No impact to population, but increase in individuals. Habitat improved.	No impact to population, but possible increase in individuals. Habitat improved.

Resource	Alternative A	Alternative B
Management indicator species	No change to population or habitat trends. Habitat improved.	Grazing and fire may have an effect on elk and bighorn habitat. Fire would be beneficial to habitat. Grazing would not affect Abert's squirrel, red squirrel, turkey, and hairy woodpecker habitat. Fire would be beneficial to habitat. No change to population or habitat trends. Temporary displacement of some elk. Habitat would improve.
Migratory birds	No impact to populations. Habitat and prey or forage availability improved.	Grazing would not affect habitat. Rx burning may temporarily displace individuals. Habitat and prey availability would improve. No impact to populations.
Rio Grande cutthroat trout, resident trout, aquatic macro invertebrates	No decrease in diversity or populations	Protections provided for riparian habitat and improved livestock distribution would reduce livestock impacts to aquatic animal habitat.
Cultural Resources	No adverse effect on sensitive and non-sensitive cultural sites.	No adverse effect on sensitive cultural sites. Possible livestock trampling on non-sensitive sites but no resulting loss of sites.
Wilderness	Wilderness characteristics would be maintained under both alternatives.	
Wild and Scenic Rivers	No effect on the wild and scenic river values. Eligibility values of recreation and fisheries of Rito Alamos would be maintained.	Eligibility values of recreation and fisheries of Rito Alamos would be maintained.
Economics	No income generated by permittees from livestock business on allotment.	Estimated gross income of \$14,432-\$16,055 generated by permittees from livestock business on allotment.
Social Environment	Permittees would find alternate grazing location, may have to reduce numbers, or cease operations.	Existing traditions of livestock management would continue for permittees.

Chapter 3 – Environmental Consequences

Chapter 3 summarizes the physical, biological, social, and economic environments of the allotment and the potential changes (direct or indirect) to these environments if the alternatives were implemented. Chapter 3 also presents the scientific and analytical basis for the comparison of alternatives, as presented in table 3. Chapter 3 complies with the implementing regulations (40 CFR 1500-1508) of the National Environmental Policy Act (NEPA) for analytic and concise environmental documents (40 CFR 1502.2). The project record contains copies of the effects analyses for the resources analyzed. An index to the project record can be found in Appendix A. The analysis of effects for alternative B under each resource takes into consideration the mitigation measures described in chapter 2.

Cumulative Effects Analysis

A cumulative effect is the effect on the environment that results from the incremental effect of the action when added to the effects of other past, present, and reasonably foreseeable future actions, regardless of what agency or person undertakes the other actions and regardless of land ownership on which the other actions occur (40 CFR 1508.7). An individual action when considered alone may not have a significant effect, but when its effects are considered in sum with the effects of other actions, the effects may be significant.

Cumulative effects were assessed in terms of how the alternatives would add to the past, present, and reasonably foreseeable future activities, within and around the allotment (table 4). Existing conditions by resource reflect the past actions that have occurred on the allotment. The specialists identified reasonably foreseeable future activities that overlap in time and location of each alternative. The incremental effect of the action when added to the alternative was then analyzed.

Table 4. Past and present activities in and around the Angostura Allotment

Past and Current Activity Name	Timeframe	Comments
Acequias and associated water diversions.	1835 (predate the Forest Service)	<p>La Sierra ditch was changed in the last few decades, which has changed the channel form of Alamitos Creek. La Sierra Ditch was constructed around 1835 and currently takes water to the community of Holman. This ditch takes water out of Alamitos Creek. The later constructed diversion at Angostura also takes one mile of the water from the Angostura Creek headwaters. This changes the capability of those creeks to function as they would naturally. These diversions predate the Forest Service.</p> <p>Water diversions: Rito Angostura - La Sierra Ditch at headwaters and Loma Linda diversion ~ 1 mile above the mouth; Alamitos – La Sierra Ditch intersects ~ 1 mile above the Forest Boundary and Acequia Encinal diverts channel ~ ¼ mile above La Sierra Ditch</p>
Santa Barbara Tie and Pole Company (SBTPC) Timber harvesting and livestock grazing.	Early 1900’s (predates Forest Service)	Prior to transfer to the Carson NF in 1931, much of the land was owned by the SBTPC. Predominant land use activities were timber harvesting and livestock grazing. This involved logging to timberline, flumes in drainages to transport logs, and five miles of rail line. Rito Angostura and possibly Agua Sarca Canyon stream

Past and Current Activity Name	Timeframe	Comments
		channels were altered (rocks and logs removed) to facilitate movement of ties to stockpiling yard at Tres Ritos. Logging was in full swing by 1909. By the late 1920s demand for timber fell and the SBRTC started selling its holdings.
Timber Sale (TS) Activities	Past 20 years	<ol style="list-style-type: none"> 1. Duran TS 23 acres 60 MBF 1985; 2. Picacho TS 488 acres 5836 MBF 1985; 3. East Raton TS 5 acres 63 MBF 1986; 4. West Raton TS 7 acres 88 MBF 1985; 5. Drop Out TS 275 acres 2036 MBF 1986; 6. Alamitos TS 523 acres 5294 MBF 1988
Historic grazing	1960's to present	The Angostura Allotment is made up of the old Angostura Allotment, the old Holman Allotment, and the old Jicarita Allotment. These were combined in the late 1960's into the current Angostura Allotment. Prior to 1970, there were sheep grazing in the Jicarita Allotment. Sheep numbers varied from 400 to over 1200 with varying seasons of use and utilizing portions of today's Knob and Santa Barbara allotments. Cattle numbers permitted on the old Angostura Allotment varied from 105 cow/calf pairs to 121 cow/calf pairs between 1946-1949 and from 66-77 between 1950-1961. These areas were rated as having fair range condition with an upward trend during range analyses in the 1960s.

Cumulative Effects of Reasonably Foreseeable Future Activities

Proposed Management of Motorized Use on the Camino Real Ranger District

The Carson National Forest is in the process of designating roads and trails open to motorized travel and prohibiting cross-country travel by motorized vehicles (“travel management”). This proposal was first listed on the schedule of proposed actions (SOPA) on July 1, 2008 and is undergoing the NEPA analysis process and a decision is expected in May 2009, with an implementation date of October 2009. A proposed action has not been released for the Camino Real Ranger District. The allotment is partially within an area currently closed to off-road vehicle travel. Motor vehicle travel is restricted to designated roads and trails (Forest Plan 1986, as amended). The areas currently open to off-road vehicle travel will be closed to off-road motorized vehicle travel (Travel Management Rule). Currently designated National Forest System roads should remain unchanged. For this reason, it will not be considered further in the cumulative effects analysis for the various resources.

Noxious weeds (invasive, non-native plant species)

At this time, there are no known noxious weeds infestations currently mapped within the analysis area; therefore there are no known effects from invasive species at this time. There may be some isolated populations of invasive plants within the allotment. The size and kind of infestation would be speculative. The cumulative effect of invasive plant establishment would be a reduction in available forage. The loss of forage could create resource impacts such as erosion, wildlife

displacement, habitat degradation, and declining forage production. The cumulative effect of no establishment of invasive plants would be a continuation of available forage at or near the present levels. The Carson and Santa Fe National Forests are in the process of making a decision on controlling and preventing the spreads of invasive non-native plants on their respective National Forest System (NFS) lands. A decision is expected in calendar year 2009.

Alamitos Creek Fish Barrier

A proposal to install or reconstruct a barrier along Alamitos Creek to ensure nonnative trout species do not move up into native Rio Grande cutthroat habitat is being considered by the Camino Real Ranger District. The exact location of the proposed barrier has not yet been determined. NEPA analysis of this proposal is needed and implementation may occur in the next two years.

Affected Environment

The Angostura Allotment is located within portions of Township 21 North, Range 13 East, Sections 10-16, 22-27, 35-36; Township 21 North, Range 14 East, Sections 3-10, 15-21, 30. Township 22 North, Range 13 East, Sections 24-25; Township 22 North, Range 14 East, Sections 19-21, 23, 26-35. Mexico Principal Meridian. The allotment contains approximately 17,716 acres ranging in elevation from 9,000-12,000 feet. It is located within the Upper Rio Grande River Basin watershed at the headwaters of the Rio Pueblo. The drainages located within the allotment include the Angostura, Alamitos, Raton, and Agua Sarca.

The Angostura Allotment is made up of the old Angostura Allotment, the old Holman Allotment, and the old Jicarita Allotment. These were combined in the late 1960's into the current Angostura Allotment. Prior to 1970, there was sheep grazing in the Jicarita Allotment. Sheep numbers varied from 400 to over 1200 with varying seasons of use and utilizing portions of today's Knob and Santa Barbara Allotments. Cattle numbers permitted on the old Angostura Allotment varied from 105 cow/calf pairs to 121 cow/calf pairs between 1946-1949 and from 66-77 between 1950-1961. These areas were rated as having fair range condition with an upward trend during range analyses in the 1960s. The allotment is currently permitted for a total of 85 cow/calf pairs. This increased number from the pre-1960's old Angostura Allotment number reflects the increased grazing capacity from combining three allotments into the current Angostura Allotment.

The forest plan provides the overall direction to meet desired conditions for the Carson National Forest. The Angostura Allotment falls within 12 management areas (MA): MA1 - Spruce under 40% slopes, MA3 - Mixed Conifer under 40% slopes, MA5 - Mixed Conifer and Ponderosa Pine Over 40%, MA6 - Aspen, MA7 - Unsuitable Timber, MA9 - High Elevation Grassland, MA13 - Oak, MA14 - Riparian, MA15 - Potential Recreation Sites, MA16 - Recreation Sites, and MA20 - Semi-primitive; and Santa Fe National Forest Plan for Pecos Wilderness Area - SFNF Plan Management Area H – Wilderness Area. .

Of the 17,716 acres of the allotment, 3,234 acres are considered to have the capacity for livestock grazing. The effects analysis focuses primarily within the grazable acres where livestock would be present. The vegetation types present across the entire allotment include the following: mountain meadows, mixed conifer, oak, aspen, ponderosa pine, spruce fir, and alpine.

Effects of Each Alternative by Resource

The following resources were analyzed by specialists in relation to the effects on each resource anticipated with the implementation of each alternative: range condition and trend, soils, riparian areas, water quality, wetlands, floodplains, air quality, wildlife, cultural resources, wilderness, wild and scenic rivers, economics, and social environment.

Range Condition and Trend

Range condition and trend of the Angostura Allotment has been monitored by the Forest Service since the acquisition of the area in the 1930's. The Angostura allotment vegetation communities consist of mountain meadows, mixed conifer, oak, aspen, ponderosa pine, spruce fir, and alpine. Grazing by livestock may impact vegetation by changing the mix of species in the plant communities being grazed; by changing the density and frequency of perennial forage plants; and by changing the vigor of the grazed plants. Range condition classes (excellent, good, fair, poor, very poor) show the relative effects of grazing on vegetation (USDA 1988). Repeated grazing above 45 percent use reduces plant vigor and root production (Paulsen, 1975). Grazing of less than 35 percent leaves much of the plant leaf and stem to become old and decadent in the short term. This chokes the plant and damages the plant slowly (Savory, 1988). Buildup of litter lowers soil temperature, reduces microbial activity, ties up nutrients, and slows the nitrogen cycling process (Paulsen 1975). Light to moderate grazing promotes vigorous regrowth of roots, leaves, and microorganisms underground (Holechek, et al. 2004). Changes in disturbance cycles, for example fire, also has an affect on vegetation composition and productivity.

Range trend expresses the direction of change in range condition in response to livestock management practices or other land use activities, in combination with other environmental factors (FSH 2209.21 CH 40.5-2). A stable trend means soil is held in place by vegetation, forage species are all-aged and reproducing vegetation cover is being maintained. A stable trend also indicates the mix of species is being maintained, as well as the density and frequency of perennial forage plants and plant vigor. It is important to note that range condition on a downward trend may not necessarily be "bad". For example: the encroachment of woody shrubs and saplings may indicate a downward trend in grass species that benefit livestock. However, the new vegetation type may provide hiding cover and browse for wildlife. A downward trend does indicate a reduction in forage availability for livestock and wildlife that benefit from grasses and forbs, which may reduce the grazing capacity of the allotment. A reduction in desirable forage plant species results in a lower range condition and trend rating.

Table 5 summarizes current range condition and trend for pastures on the Angostura allotment. Range condition for the Angostura Grazing Allotment was determined by revisiting historic Parker 3-step clusters and scoring them again. The method compiles information on native species composition, plant density, plant frequency, age classes of range plants, diversity of range plants, and range plant vigor. In addition to range condition classes, range trend is also determined showing whether conditions are improving or declining. Soils are also evaluated for current or potential erosion. [55]

The existing conditions are partly a result of past and present activities. Many range improvements and management procedures were initiated in the last fifty years and sheep grazing was discontinued in the high elevation areas. Management activities have been successful in

restoring much of the degradation previously documented. Many of the photo points have been revisited and there is evident recovery in some of the areas of historic concern.

Many meadows are being encroached upon by trees and most of the timber sale sites are returning to conifers. As sunlight is reduced to the forest floor, the growth and diversity of herbaceous vegetation in these areas is often reduced. In the areas where the forest encroachment and succession back towards forest has progressed furthest, the range condition is fair to good, but with downward trend due to the shift in species composition away from forage species.

Where the forest encroachment has not occurred, range condition has improved as a result of successful past management. The true grass portions of the allotment are in good to excellent condition, but most of the key areas are dominated by Kentucky bluegrass.

There are portions of the allotment that are not used regularly due to the isolation of the meadows, the proximity to Highway 518, higher elevations, and locations within the wilderness. These areas are still available for use by livestock but would require more intensive management by the permittees. They are available for and used by wildlife. Range conditions in the higher elevation areas are showing dramatic improvement since sheep grazing was discontinued. Many problem areas that warranted photo points in the 1970's are barely noticeable now.

Elk and elk sign (droppings) have been observed throughout the allotment, indicating a well-distributed herd utilizing the allotment. Elk graze the allotment season-long in large numbers. They start immediately following the snow melt and forage green up, and remain throughout the growing season and well into the fall and winter. Usually the snow pack drives them from the allotment during the winter, but in dry years they may remain on the more habitable sites. They use more of the forage-producing terrain than cattle, spending much time in the steep and denser forested areas. They also use areas of aspen encroachment on previously open grassland.

Table 5. Existing Range Condition and Trend read in 2005/2006

Parker 3- step Cluster #	Vegetation Score/Trend	Soil score/Trend
C1	70 Good /→*	64 Good /→
C2	72 Good /→	85 Excellent /↑*
Jicarita C1	68 Good /→	74 Good /→
Jicarita C2	82 Excellent /→	90 Excellent /→
*→ = stable trend; ↑ = upward trend		

The clusters in the original Angostura allotment were established in 1957. That was the last time they were read. The clusters of the original Jicarita allotment were established in 1952 and last read in 1955. The clusters all scored higher in 2005/2006 than when they were read in 1955 and 1957.

Effects by Alternative

Table 6. Comparison of the expected effects of each alternative on range condition and trend by percent of the allotment in each condition class

Condition Class	Alternative A	Alternative B	2005/2006 Range Analysis (represents existing condition)
Excellent	3%	3%	2%
Good	13%	15%	15%
Fair	2%	0%	1%
Poor	0%	0%	0%
Very poor	0	0	0
Non-range*	82	82	82
Trend	Alternative A	Alternative B	2005/2006 Range Analysis
Upward	0%	2%	0%
Stable	16%	16%	16%
Downward	2%	0%	2%
Non-range	82	82	82

*Areas that have poor soils and are not likely to be grazed due to dense canopy, lack of forage, or steep slopes were considered “non-range”. The combination of tree or brush density, low forage plant density or productivity and steep slopes are the main reasons for areas to be designated in this category.

Alternative A

Livestock grazing would no longer be a permitted activity on the Angostura Allotment. The existing term grazing permit would be terminated and cattle would be removed from the allotment. Understory vegetation would no longer be grazed by cattle, but would continue to be grazed by deer, elk, and bighorn sheep. Elk use a wider range of terrain than cattle so the use patterns of grazers would be more evenly distributed across the forage producing areas of the allotment. Removing cattle would leave more forage available to wildlife.

Naturally occurring meadows and small openings would continue to be dominated by Kentucky bluegrass, which is an aggressive species that would continue its competitive advantage. On areas that contain a component of native grasses and sedges, these species would increase over the long term.

Plant species composition, which dictates calculated range condition, in the open meadows would remain basically static in the short and mid term, since elk grazing would be ongoing. As forest succession into the transitional range increases, the wildlife demand for forage from true meadows would increase. The effect of elk on the open meadows would be a change to less desirable forage plants.

Removing cattle would not affect the trend toward continued forest encroachment. As forest succession proceeds, range condition in the transitional rangelands would be expected to decline. Most of the transitional rangelands are expected to fall into a stable or downward trend as woody vegetation increases. Effects of woody vegetation include buildup of litter, which lowers soil temperature, increases microclimate moisture, reduces microbial activity, ties up nutrients, and slows the nitrogen cycling process. Plant vigor and composition would be expected to change. Graminoid plants would not be as vigorous, and species composition would change as the vegetation moves toward climax. Small isolated meadows surrounded by closed forest canopies would continue to support wildlife grazing.

Alternative B

Current allotment-wide acceptable conditions would be maintained or improve. Range condition would continue to improve as a result of both proposed and historic management changes, capacity could increase as a result of prescribed burning to maintain meadows and openings, and utilization guidelines would continue to be met.

Riparian conditions around Loring Spring and Agua Sarca Spring would improve. Moving drinkers out of riparian areas onto drier sites would move the concentrated use as well.

Scheduling limited grazing within the Agua Sarca area would allow for more intensive management of that small area. Under current management the Agua Sarca area is used in conjunction with the rest of the Loring Spring/ Agua Sarca pasture. Additional herding and salting by the permittee(s) may be required to achieve the desired level of use.

Burning of meadows and forest openings would reduce the encroachment of woody vegetation. 789 acres would be maintained as meadows and forested openings. Range condition in the burned areas would be expected to stabilize or slightly improve from fair to good, and good to excellent with upward and stable trends. Forage production would increase temporarily as natural succession toward forest is delayed. Capacity in the burned areas would increase, enabling rest and deferment of other areas. Distribution of cattle use would improve as treated areas become more inviting. Wildlife use would increase as well in the treated areas, relieving pressure on other areas in the allotment.

Since any prescribed burning treatment would cover less than 5% of the allotment, much of the encroachment would continue and some portions of the grazeable range would move from good to fair range condition as that occurs.

Cumulative Effects on Range Condition and Trend

The cumulative effects of past and present activities such as historic livestock grazing, forest encroachment, and past railroad logging are reflected in the discussion of range condition and trend by alternative. There are currently no known invasive plant populations mapped on the Angostura Allotment, therefore there are no effects from invasive species at this time. The cumulative effect of an invasive plant control project would be a reduction in the potential for invasive plant populations to become established on the allotment which could create resource impacts such as loss of native vegetation, increased erosion, habitat degradation, and declining forage production. If invasive plants become established, the risk would exist for the population to potentially expand impacting natural resources.

Soils, Watershed, Riparian Areas, Water Quality, and Wetlands

The Angostura Allotment contains approximately 17,670 acres in the Embudo Creek Watershed of the Upper Rio Grande River Basin. Elevation ranges from 8,520 ft on the Rio Pueblo to 12,835 ft at Jicarita Peak. Average annual precipitation ranges from 23 inches at the lower elevations to 33 inches at the upper elevations. Streams and overland flow processes are dominated by snowmelt runoff, with peak flows occurring in mid-late May of a typical year. [60]

Stream Channel and Riparian Area Inventory

The following data and documents were reviewed:

- Riparian proper functioning condition assessments for Agua Sarca Canyon, Raton Canyon, Rio Pueblo, Alamitos Creek, Rito Angostura, their tributaries and some springs (2007-2008)
- Riparian Area Survey and Evaluation System (RASES) inventory, Rio Pueblo, Alamitos Creek, Rito Angostura (1988 - 1991)
- Carson National Forest, Camino Real Ranger District Range data (various dates)
- Alamitos Creek and Rito Angostura Acequias

The hydrology and stream channel morphology of Alamitos Creek and Rito Angostura have been altered by diversions which transfer water from the Rio Grande Basin into the Canadian River Basin (Figure SW-2). NMED (2007a) summarizes documentation related to the acequias. One acequia (known locally as Encinal Canoncitos) diverts water from Alamitos Creek (middle branch of the Rio Pueblo, Picuris) and was completed by 1832. Acequia de la Sierra (La Sierra Ditch) captures the three headwater streams of Rito Angostura (southern branch of the Rio Pueblo, Picuris) and was completed by 1882. A third acequia, which is abandoned, diverted water from Rito Angostura approximately 1.25 miles downstream from the existing diversions and tied into the La Sierra Ditch.

The La Sierra Ditch effectively captures all flow from the headwaters of Rito Angostura, hence, all streamflow downstream of the diversions is derived from local rainfall or snowmelt runoff and from groundwater (except, of course, when the ditch breaches and water temporarily flows to the stream). Acequia Encinal Canoncitos captures bankfull and lower flows. The La Sierra Ditch crosses Alamitos Creek ~ 0.25 miles downstream of the Encinal Canoncitos diversion and captures additional flow from Alamitos Creek, although higher flows would also return to Alamitos Creek. Summer and late season flows in Alamitos Creek downstream of the diversions are derived primarily from effluent groundwater. A USGS stream gauging station (07214680) was installed in 2003 in the La Sierra Ditch at the Forest Service boundary to monitor flow from June through September.

The diversions affect the lower 4.7 miles (of 6.1 stream miles, or 77%) of Rito Angostura and 5.2 (of 10.8 miles, or 48%) of Alamitos Creek. Flow records from USGS station 07214680 from June 2003-Sept 2007 show an average monthly diversion of 8.3, 3.0, 1.6 and 1.4 cfs, respectively. The amount of water diverted from each stream is not measured directly, however, stream flow

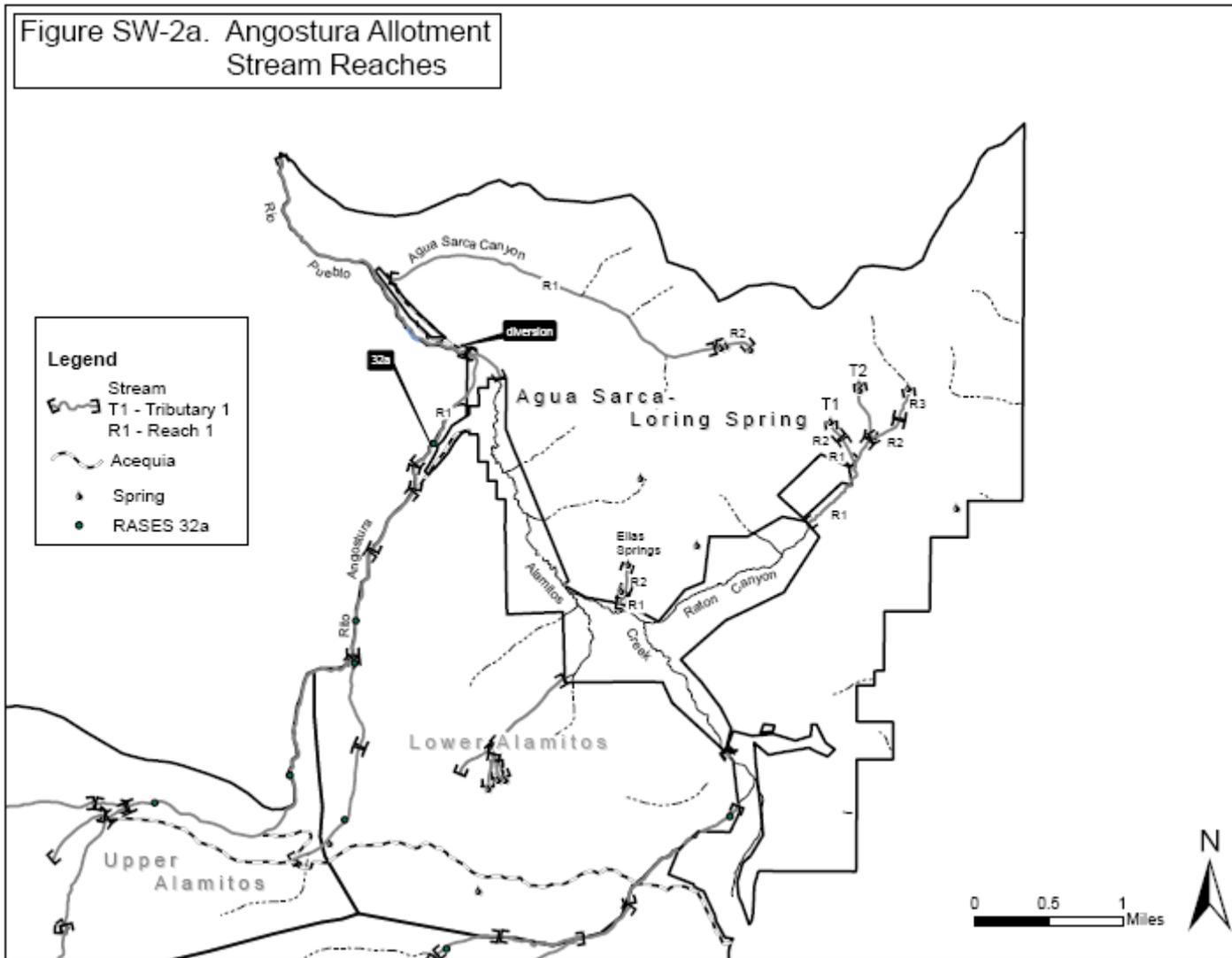


Figure 2. Angostura Allotment Stream Reaches – northeastern portion of allotment

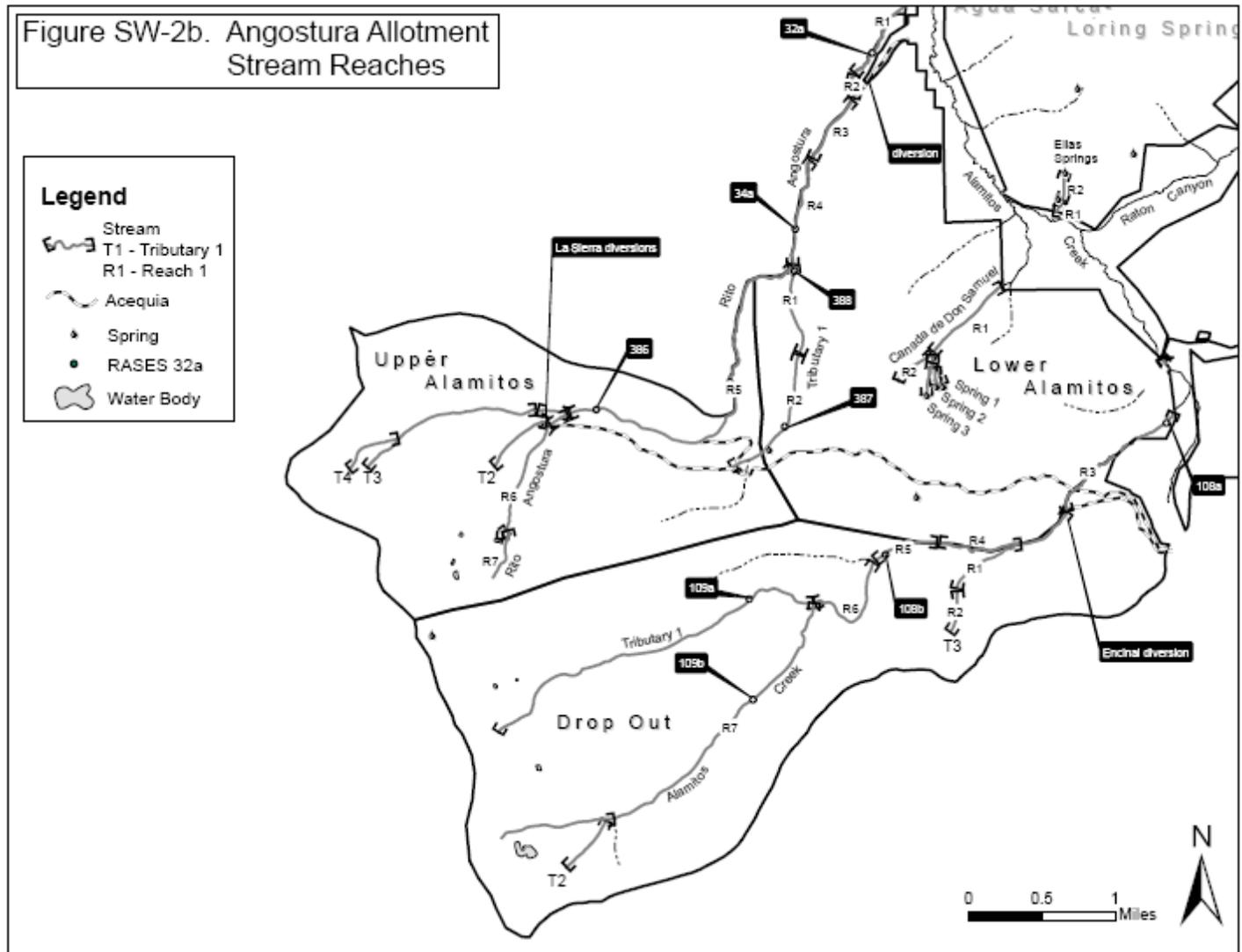


Figure 3. Angostura Allotment Stream Reaches – southwestern portion of allotment

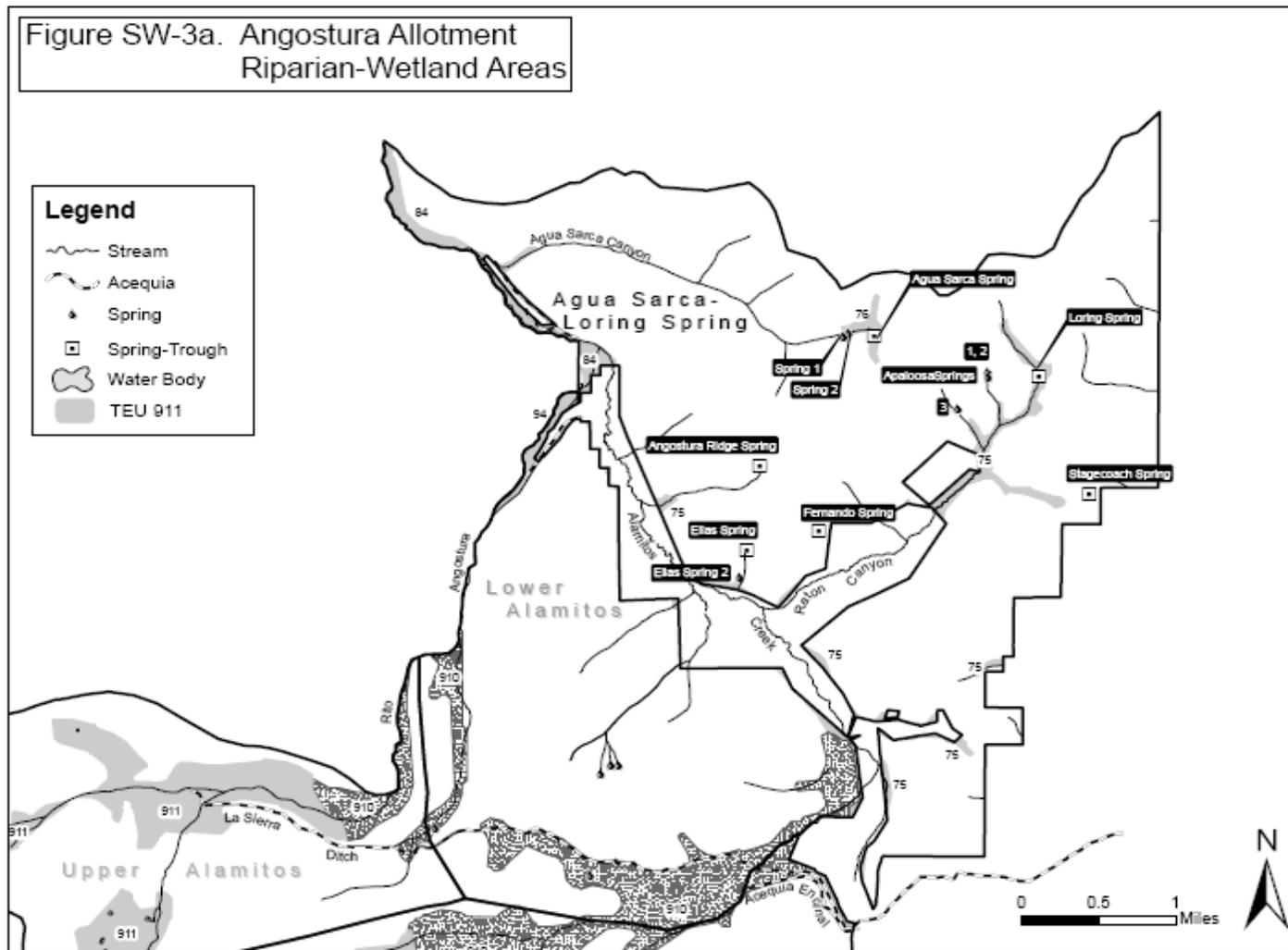


Figure 4. Angostura Allotment Riparian-Wetland Areas - northeast portion of the allotment

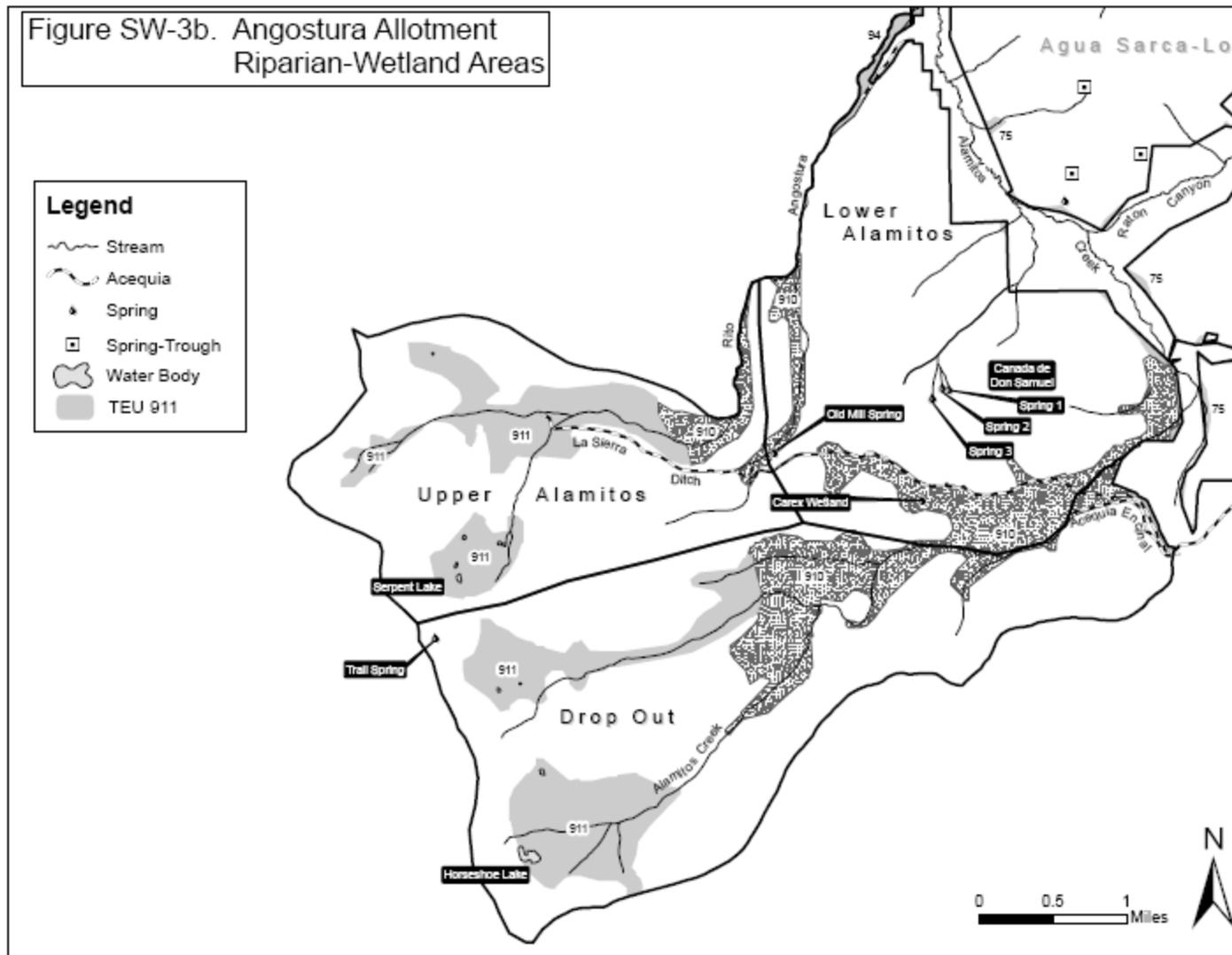


Figure 5. Angostura Allotment Riparian-Wetland Areas – southwestern portion of the allotment

measurements conducted during RASES inventory indicate that a substantial amount of flow is being diverted from Alamitos Creek [60].

Stream channel dimensions were probably still adjusting to the altered flow regime at the time of logging in the early 20th century, as the La Sierra diversions were only about 40 years old. These effects were further compounded by the watershed-scale changes and channel modifications created during the tie and pole operations. Runoff was characterized by short duration, high peak flash-flood type events rather than longer duration, lower peak flows typical of mature forests. Today, large woody debris recruitment into stream channels is beginning to occur.

Stream Associated Riparian-Wetland Properly Functioning Condition Assessments

The allotment contains numerous mapped and unmapped perennial and intermittent streams, with approximately 26, 4 and 10 miles of perennial, intermittent and ephemeral streams. Table 7 shows the length of perennial (P) and intermittent (I) miles in the allotment. The Angostura Allotment contains the headwaters of the Rio Pueblo.

Table 7. Perennial and Intermittent Streams within the Angostura Allotment.

Stream	Miles	Flow	Stream	Miles	Flow
Alamitos Creek	6.5	P	Rito Angostura	6.2	P
Alamitos Tributary 1	2.6	P	Rito Angostura Tributary 1	0.6	P
Alamitos Tributary 2	0.4	P	Rito Angostura Tributary 2	0.6	P
Alamitos Tributary 3	0.9	P	Rito Angostura Tributary 3	1.3	P
Canada de Don Samuel	1.3	P	Rito Angostura Tributary 3	0.4	P
Unnamed Tributaries	0.8	P	Unnamed Tributaries	1.4	I
Raton Canyon	1.3	P	Agua Sarca Canyon	0.3	P
Raton Canyon Tributary 1	0.3	P	Agua Sarca Canyon	2.5	I
Raton Canyon Tributary 2	0.4	P	La Sierra Ditch	5.0	P
Rio Pueblo	2.2	P	Acequia Encinal Canonicitos	1.0	P

The Carson National Forest conducted riparian proper functioning condition (PFC) assessments for lotic (flowing) riparian-wetland areas in 2007-08 (USDI BLM 1998). The stream channel (or lotic) assessment integrates hydrology, vegetation and erosion/deposition attributes to assess how well the physical processes are functioning. The PFC assessment included only major, perennial streams.

“Lotic”, or flowing, riparian-wetland areas are properly functioning when adequate vegetation, landform, or large woody debris are present to: dissipate stream energy associated with high flows; filter sediment, capture bedload and build floodplains; improve flood water retention and ground water recharge; develop root masses to stabilize stream banks; and develop diverse

channel characteristics to provide fish and wildlife habitat. Functional-at risk riparian areas contain a soil, water, or vegetation attribute that makes them susceptible to degradation, while nonfunctional systems are clearly not providing adequate vegetation, landform or large woody debris to dissipate stream energy, improve flood water retention and stabilize stream banks.

PFC is not desired condition, rather, it is a prerequisite to achieving desired condition (USDI BLM 1998). The threshold is at least properly functioning because any rating below this would not be sustainable. Tables 8 to 12 summarize the PFC assessments (see Figures 2 and 3 for location of stream segments).

Table 8. Riparian proper functioning condition summary for stream miles in the Angostura Allotment.

Pasture	PFC	FARU	FARS	FARD	NF	ND	Total
Agua Sarca-Loring Spring	1.4	2.5	0.3	2.8	0.0	0.8	7.8
Lower Alamitos	2.8	1.0 ⁽¹⁾	2.8 ⁽²⁾	0.2	0.0	0.1	6.9
Dropout	7.1	1.0 ⁽¹⁾	1.1 ⁽²⁾	0.0	0.0	0.4	9.6
Upper Alamitos	3.0	0.0	2.6	0.0	0.0	0.9	6.5
Total:	14.3	3.5 ⁽³⁾	6.2 ⁽³⁾	3.0	0.0	2.2	29.2 ⁽³⁾

PFC=Proper Functioning Condition; FARU=Functional-at Risk with an Upward Trend; FARS=Functional-at Risk with no apparent (Static) trend; FARD=Functional-at Risk with a Downward trend; NF=Non Functional; ND=No Data; Total=Total known miles of perennial and intermittent streams in the allotment
 (1) 1.0 mile of Alamitos Creek forms a common boundary between Lower Alamitos and Dropout
 (2) 0.5 miles of Alamitos Creek forms a common boundary between Lower Alamitos and Dropout
 (3) Total - only counts the Alamitos common boundary once

Table 9. Riparian proper functioning condition-Agua Sarca-Loring Spring Pasture

Stream ID	Miles	Acres	Flow	PFC
<i>Rio Pueblo</i> RPUEB_R01	2.2	8.0	P	FARU
<i>Alamitos Creek</i> ALAM_R01	0.3	1.0	P	PFC
<i>Agua Sarca Canyon</i> ASARC_R01	2.5	3	I	FARD
ASARC_R02	0.25	1	P	FARD
<i>Raton Canyon</i> RATO_R01	0.8	2	P	NR
RATO_R02	0.25	0.2	P	FARS
RATO_R03	0.25	0.5	P	FARU
<i>Raton Tributary 1</i> RATO_T1_R01	0.2	0.25	P	PFC
RATO_T1_R02	0.15	0.2	P	PFC
<i>Raton Tributary 2</i>	0.4	1.0	P	PFC

Stream ID	Miles	Acres	Flow	PFC
RATO_T2_R01				
<i>Elias Springs</i> Elias Spring 01	0.1	0.1	P	PFC
Elias Spring 02	0.2	0.2	P	PFC
Elias Spring 03	0.1	0.1	P	PFC

PFC descriptions – see notes under table 8 above

Table 10. Riparian proper functioning condition – Lower Alamitos Pasture

Stream ID	Miles	Acres	Flow	PFC
<i>Alamitos Creek</i> ALAM_R03	0.95	5	P	FARS
ALAM_R04	1.0	5	P	FARU
<i>Rito Angostura</i> ANGO_R01	1.0	5	P	FARS
ANGO_R02	0.2	1	P	FARD
ANGO_R03	0.5	1.5	P	PFC
ANGO_R04	0.8	1.5	P	PFC
<i>Rito Angostura Tributary 1</i> ANGO_T1_R01	0.7	1	I	PFC
ANGO_T1_R02	1.0	1.1	I	FARS
<i>Canada de Don Samuel</i> DSAM_R01	0.7	1.5	P	FARS
DSAM_R02	0.3	0.4	I	PFC
DSAM_SPR01	0.25	0.3	P	PFC
DSAM_SPR02	0.15	0.25	P	FARS
DSAM_SPR03	0.25	0.5	P	PFC

PFC descriptions – see notes under table 8 above

Table 11. Riparian proper functioning condition – Upper Alamitos Pasture

Stream ID	Miles	Acres	Flow	PFC
<i>Rito Angostura</i> ANGO_R05	2.6	8	P	FARS
ANGO_R06	1.2	4	P	PFC
<i>Rito Angostura Tributaries</i> ANGO_T02_R01	0.5	2	P	PFC
ANGO_T03_R01	1.3	4	P	PFC

PFC descriptions – see notes under table 8 above

Table 12. Riparian Proper Functioning Condition – Dropout Pasture

Stream ID	Miles	Acres	Flow	PFC
<i>Alamitos Creek</i> ALAM_R05	0.5	2	P	PFC
ALAM_R06	0.8	2	P	PFC
ALAM_R07	2.9	9	P	PFC
<i>Alamitos Creek Tributaries</i> ALAM_T01_R01	2.6	8	P	PFC
ALAM_T02_R01	0.5	ND	P	NR
ALAM_T03_R01	0.6	1	P	FARS
ALAM_T03_R02	0.3	0.5	P	PFC

PFC descriptions – see notes under table 8 above

Terrestrial ecosystem unit (TEU) mapping indicates that the Angostura allotment may contain up to 1,108 acres of habitat that exhibit riparian-wetland characteristics (USDA Forest Service 1987).

The Angostura Allotment contains 9 mapped lakes/ponds, 13 known springs (1 mapped spring, 12 previously unmapped), and numerous unmapped and uninventoried riparian-wetland areas in the headwaters of Alamitos Creek and Rito Angostura.

The Carson National Forest conducted limited riparian proper functioning condition (PFC) assessments for lentic (seeps, springs, wet meadows) riparian-wetland areas in 2006-2008 (USDI 1999). Riparian proper functioning condition refers to how well the physical processes are functioning. Lentic riparian-wetland areas are properly functioning when adequate vegetation, landform, or large woody debris are present to: dissipate stream energy associated with wind action, wave action and overland flow from adjacent sites, thereby reducing erosion; filter sediment and aid in floodplain development; improve flood water retention and ground water recharge; develop root masses to stabilize island and shoreline features; restrict water percolation; and develop diverse ponding characteristics to provide fish and wildlife habitat.

Most of the springs assessed are source water areas for stream reaches listed in Tables 8 to 12 and stream rating would also apply to the source spring. Table 13 summarizes riparian proper functioning condition assessments for inventoried lentic riparian-wetland areas of the Angostura Allotment (see Figures 4 and 5 for locations).

Table 13. Seep/Spring Associated Riparian Proper Functioning Condition Summary

Riparian ID	Stream Reach	PFC	Comments
<i>Agua Sarca-Loring Spring Pasture</i> Agua Sarca Spring 1	ASARC_R01	FARD	Spring box/trough; Fence down, bare soil, livestock trailing; sedge/grass
Agua Sarca Spring 2	ASARC_R01	FARS	Bare soil; sedge species

Riparian ID	Stream Reach	PFC	Comments
Agua Sarca Spring 3	ASARC_R01	FARD	Bare soil, livestock trailing; sedge species
Loring Spring	RATO_R03	FARS	Spring box/trough; Fence at spring box only; Sedge/grass
Apaloosa Spring 1	RATO_T02_R01	PFC	Spruce-Fir overstory; mesic forb
Apaloosa Spring 2	RATO_T02_R01	PFC	Spruce-Fir overstory; mesic forb
Apaloosa Spring 3	RATO_T01_R02	PFC	Spruce-Fir overstory; mesic forb
Elias Spring 1	Elias Spring 01	NF	Spring box/trough; Fence at spring box only, no riparian at source
Elias Spring 2	Elias Spring 02	PFC	Spruce-Fir overstory; mesic forb
Lower Alamitos Pasture Don Samuel Spring 1	DSAM_SPR01	PFC	Spruce-Fir overstory; mesic forb
Don Samuel Spring 2	DSAM_SPR01	FARS	Skidded through; mesic forb/grass/sedge
Don Samuel Spring 3	DSAM_SPR01	PFC	Spruce-Fir-Aspen overstory; mesic forb
Carex wetland	N/A	PFC	Nebraska sedge/Beaked sedge; old growth Bebb Willow
Old Mill Spring	N/A	FARD	Grass/Forb
Dropout Pasture Trail Spring	N/A	PFC	Along Trail 19; Willow

PFC descriptions – see notes under table 8 above

Man-made water developments are another type of lentic (non-flowing) riparian-wetland area. Some developments are derived from natural sources. There are six developed springs within the analysis area.

Graham (1998) summarizes operations of the Santa Barbara Tie and Pole Company in the headwaters of the Rio Pueblo. From 1907-1931, the Santa Barbara Tie and Pole Company operated a logging operation out of Hodges (Santa Barbara drainage) and Tres Ritos (Rio Pueblo drainage). Streams were channelized and boulders removed to expedite the floating of logs. Many miles of flumes were constructed to transport logs or cut ties from the upper parts of the watershed to holding areas at Hodges and Tres Ritos. Although the exact extent of the operation is not known, the removal of nearly every tree that could be made into a tie, in addition to grazing practices at that time, affected the way the watersheds captured, stored and released water (snowmelt and rainfall runoff). Much of the land became part of the Carson National Forest after it was sold to the U.S. government in 1931. The report alluded to restoration efforts that were implemented after transfer of ownership, although records of any work in the Angostura Allotment could not be found. Wire check structures were found in the Rio Pueblo, however the

extent of these is not known. Similar structures were installed in the Rio Fernando de Taos in the 1930s or 40s at approximately 70-ft intervals.

Beneficial Uses and Water Quality

The State of New Mexico Environment Department has identified water quality standards (Appendix SW-3, NMED 2008a) and beneficial uses for waters of the State. Table 14 lists the beneficial use and support status for the Rio Pueblo within the allotment. The Rio Pueblo is listed on the 2008-2010 303(d) list of impaired waterbodies. Due to a mapping error on previous 303(d)/305(b) Reports, Alamitos Creek was included as part of the Rio Pueblo. For the 2008-2010 list, NMED has added a new assessment unit for Alamitos Creek as a category 3, with an attainment status of ‘not assessed’.

All other perennial streams have the same uses and have not been assessed for beneficial use support. All intermittent waters have designated uses for livestock watering, wildlife habitat, aquatic life and secondary contact. All ephemeral streams have designated uses for livestock watering, wildlife habitat, limited aquatic life and secondary contact.

Table 14. Beneficial use support for Rio Pueblo (Picuris Pueblo to headwaters) (NMED 2008b)

Domestic Water Supply	Fish Culture	High Quality Cold Water Aquatic Life	Irrigation	Livestock Watering	Secondary Contact	Wildlife Habitat
Fully Supporting	Fully Supporting	Not Supporting	Fully Supporting	Not Assessed	Not Assessed	Fully Supporting

Water Quality Data Review

Water quality data search and review for this analysis include the following:

- EPA STORET Database Search (<http://www.epa.gov/storet/>) – no data
- USGS NWIS Database Search (<http://waterdata.usgs.gov/nwis/qw>) – no data
- Carson National Forest RASES field data forms
- Carson National Forest 2004 Aquatic Invertebrate Report
- Carson National Forest Camino Real Ranger District 1995 Watershed Report
- NMED (2004) Water Quality Summary for the Upper Rio Grande Part II
- NMED (2008a) 303(d)/305(b) Report

The NMED SWQB conducts TMDLs on an 8 year rotational watershed monitoring schedule. The Rio Pueblo was intensively sampled during the Upper Rio Grande Part II 2001 (NMED 2004) survey at three sites and the TMDL is tentatively set for 2009. The site sampled closest to the Angostura Allotment was near the Flechado Campground, located approximately 2 ½ miles downstream of the allotment boundary.

Review of water quality data collected during RASES inventory indicated that pH, specific conductance and instantaneous temperature were within current water quality standards. Turbidity data from one site on lower Rito Angostura and the Rio Pueblo above Rito Angostura for three dates (spring runoff, low flow and summer thunderstorm) in 1995 met the current standard (USDA Forest Service 1995).

Temperature and Sediment

Stream temperature is a function of channel dimensions (width and depth), shade (reduction of incoming solar radiation), extent of groundwater contribution to flow (hyporheic exchange) and solar radiation (Adams and Sullivan 1989). Stream temperatures are also correlated with local air temperatures, both of which increase downstream, due to adiabatic changes.

Excessive sediment can impact water quality and fish habitat by increasing turbidity and stream bottom deposits. Of the stream reaches assessed, Agua Sarca, Raton Canyon, and Rito Angostura contain active headcuts. Headcuts create unstable stream banks, which contribute sediment to the stream as they advance upstream. The amount of sediment contributed is a function of the rate of advance and the rate at which the newly incised streambed and banks stabilize.

Effects of Alternatives A and B on Riparian-Wetland Areas and Stream Channels

Effects of alternatives A and B to stream channels, stream-associated riparian-wetland areas and seep/spring-associated riparian-wetland areas would be similar, over the long term. The difference between alternatives would be the expected rate of change, with alternative A generally achieving riparian management objectives in a shorter time frame than alternative B, but measurable progress would be made within the life of the grazing permit. Properly functioning riparian-wetland areas exhibit the vegetal and structural components necessary to achieve management objectives. Tables 15 and 16 summarize effects to stream and seep/spring-associated riparian-wetland areas that are not currently meeting standards or guidelines.

Table 15. Comparison among alternatives of projected condition for stream segments currently not meeting proper functioning condition.

Stream	Reach	Current Condition	Projected Trend	
			Alt A	Alt B
<i>Agua Sarca-Loring Springs Pasture</i>				
Rio Pueblo	01	FARU	Up	Up
Agua Sarca	01	FARD	Static ⁽¹⁾	Static ⁽¹⁾
	02	FARD	Up	Up
Raton Canyon	02	FARS	Static ⁽¹⁾	Static ⁽¹⁾
	03	FARU	Up	Up
Rito Angostura	01	FARS	Static	Static
<i>Lower Alamitos Pasture</i>				
Alamitos Creek	03	FARS	Static to Up ⁽²⁾	Static to Up ⁽²⁾
	04	FARU	Up	Up

Stream	Reach	Current Condition	Projected Trend	
			Alt A	Alt B
Rito Angostura	01	FARS	Static to Up	Static to Up
	02	FARD	Static ⁽¹⁾⁽²⁾	Static ⁽¹⁾⁽²⁾
Rito Angostura Tributary 01	02	FARS	Static to Up	Static to Up
Canada de Don Samuel	01	FARS	Static to Up	Static to Up
Canada de Don Samuel Spring 02	---	FARS	Static to Up	Static to Up
<i>Upper Alamos Pasture</i>				
Rito Angostura	05	FARS	Static to Up	Static to Up
<i>Dropout Pasture</i>				
Alamos Creek Tributary 03	01	FARS	Static to Up	Static to Up

(1) Static trend due to active headcuts (2) Static trend due to upstream diversions

Table 16. Comparison among alternatives of projected condition for seep/springs currently not meeting proper functioning condition.

Riparian-Wetland Area	Current Condition	Projected Trend	
		Alt A	Alt B
<i>Agua Sarca-Loring Springs Pasture</i>			
Agua Sarca Spring 01, 02, 03	FARD	Up	Up
Loring Spring	FARS	Up	Up
Elias Spring 01	NF	Static ⁽¹⁾	Static ⁽¹⁾
<i>Lower Alamos Pasture</i>			
Canada de Don Samuel Spring 02	FARS	Up	Up
Old Mill Spring	FARD	Static ⁽²⁾	Static ⁽²⁾

(1) Static trend due to spring development; (2) Static trend due to active headcut

Effects of Alternatives A and B on Water Quality

Table 14 summarizes beneficial use support for the Rio Pueblo. Under Alternatives A and B, the Rio Pueblo would continue to meet the fully supporting designated beneficial uses. NMED has not assessed beneficial use support for other waters within the allotment. The Rio Pueblo is not supporting the high quality cold water aquatic life use based on macroinvertebrate sampling. Recent macroinvertebrate data from lower Rito Angostura (tributary to the Rio Pueblo) indicated slight to moderate organic enrichment (HBI 3.99 and 4.05) and contained high species richness of pollution intolerant species. These data suggest that livestock grazing management is compatible with achieving the biological water quality criteria in Rito Angostura (the HBI score, by itself is not as meaningful as the species richness, unless compared to a reference site). Instantaneous grab

samples for pH, specific conductance and temperature in 1988, 1989 and 1991 and turbidity in 1995 would meet the current water quality criteria for those parameters.

Sedimentation due to active headcuts would continue along Agua Sarca Canyon Reach 01, Raton Canyon Reach 02, Rito Angostura Reach 02, Angostura Tributary 01 Reach 01, and Alamos Creek Tributary 03 Reach 01 as they continue to adjust to historic logging and grazing practices. Instability (Rosgen ‘G’ reaches) along Alamos Creek and Rito Angostura would also occur, as the channels continue to adjust to historic logging and grazing practices and to altered flow regimes from the diversions. Current livestock management is causing unstable conditions along upper Agua Sarca Canyon and the proposed action of repairing the Agua Sarca Spring fence and moving the drinker out of the riparian area would help to stabilize streambanks.

Effects of Alternative B from Prescribed Burning

Streamflow responses to prescribed fire are smaller in magnitude compared to the responses to wildfire. It is generally not the purpose of prescribed burning to completely consume extensive areas of litter and other decomposed organic matter on the soil surface (Folliott et al 1996, DeBano et al 1998) and, therefore, the drastic alterations in streamflow discharges that are common after severe wildfires are not expected to occur.

The temporary loss of cover would be compensated by increased vegetation ground cover following shortly after burning, during the next spring green-up, or following the next rainfall. Since broadcast burning would be restricted to low intensity fire, minimal soil erosion following broadcast burning would be expected. Low intensity broadcast burning for maintenance would scorch only the surface of the duff layer in TEUs 175, 305, 816, 817, 901, 902, and 904, on which vegetative and litter ground cover must be retained to prevent high erosion hazard risk [04]. Low intensity broadcast burning is characteristically patchy in extent, with sufficient roughness retained in the form of scattered slash, as well as areas of unburned vegetation, to further trap sediment and slow runoff. To minimize burn intensity, broadcast burning would be conducted mostly during the fall, under conditions of moderately high fuel moisture, using burn pattern methods and strategies (flank burning and backing burning) that have been developed and proven to effectively reduce the chances of the ground fire running and intensifying. Ash or sediment delivery to channels would not be expected because flowing streams are not present in or near the project area.

Steepness of the hillslope and connectivity of the road system have a strong influence on movement of soil and nutrients into stream channels where it can affect water quality. The proposed burn units contain only ephemeral channels and mitigations implemented during burning would minimize the risk of surface erosion and sedimentation.

The magnitude of the effects of fire on water quality is primarily driven by fire severity and not necessarily by fire intensity. The more severe the fire, the greater the amount of fuel consumed and nutrients released, and the more susceptible the site is to erosion of soil and nutrients into the stream where they could potentially affect water quality. Use of prescribed fire allows the manager the opportunity to control the severity of the fire and to avoid creating large areas burned at high severity.

Cumulative Effects on Riparian Areas, Water Quality, and Wetlands

The cumulative effects of past and present activities (table 4) such as past railroad logging, existing roads and trails, and water developments and acequias, are reflected in the previous discussion on riparian areas, water quality and wetlands. The proposal to prohibit cross-country travel by motorized vehicles (travel management), along with the effects of alternative B, would result in less damage to riparian areas, wetlands, seeps and springs from motorized use and would have an overall beneficial effect on the watershed and water quality. There are currently no invasive plants mapped on the Angostura Allotment, therefore there are no known effects from invasive species or future treatment.

Floodplains

Floodplains reduce the risk of loss due to floods by minimizing the impacts on human safety, health and welfare. Executive Order 11988 requires agencies to restore and preserve the beneficial values served by floodplains. Alternatives A and B do not propose occupation or development within the 100-year floodplain of any waters within the Angostura Allotment. Floodplain function of waters within the Angostura Allotment would be maintained under either alternative. [60]

Air Quality

Air quality attainment is dependent on the absence of dust and other pollutants. Livestock management activities that could produce dust include herding, gathering, trailing, and vehicle emissions. Prescribed burning within the Angostura Allotment would produce smoke. Taos County is currently considered to be in attainment of all New Mexico and National Ambient Air Quality Standards (NMED 2008). [60]

Alternative A

No dust or smoke would be generated under alternative A from livestock grazing or prescribed burning activities. There would be no direct or indirect effects of activities implemented as a part of the alternative. Attainment of air quality would be maintained.

Alternative B

Under alternative B, prevailing winds and normal ventilation would act to quickly disperse any dust generated from grazing activities. Since scale, scope, and duration of dust generating activities would be small and intermittent, air quality attainment status would not be lost due to the proposed grazing activity.

Prescribed burning of approximately 789 acres within the Angostura Allotment could cause smoke management concerns, especially if smoke drifts into populated areas. Fire managers would abide by New Mexico's Smoke Management Rule (20.2.65NMAC) through the New Mexico Air Quality Bureau, and monitor the effects of smoke associated with prescribed fire. Smoke characteristics, including density, dispersion, and impacts to receptors, would be monitored visually as required by the SMR, and when available, electronically. This monitoring (performed by the Taos Zone Coordinator) regulates prescribed burning by all major burners in the airshed by restricting or curtailing burning activities when poor ventilation conditions exist or are forecast. Compliance with New Mexico Air Quality Bureau's Smoke Management Rule

(20.2.65NMAC) and following guidance contained in the State Smoke Management Program, the proposed activities would comply with the Forest Plan and the 1977 Clean Air Act.

Wildlife

Federally Listed Species

A species list for Taos, Mora, and Rio Arriba Counties was obtained from the USFWS web-page on Oct 25, 2007. Species lists are obtained to fulfill the requirement under Section 7 (c) of the Endangered Species Act. The website was checked on August 19, 2008 and no change to the list had occurred. Species were eliminated from evaluation and/or consideration based upon 1) lack of potential habitat; 2) area not included in historic or current range of the species; or 3) extirpation of the species without current feasibility for reintroduction. [52]

Table 17. Federally listed species reviewed for this analysis

Species	Status	Justification	Excluded from Further Analysis
Mexican spotted owl (<i>Strix occidentalis lucida</i>)	Threatened	Suitable habitat for this species does occur within the allotment. Analysis for this species is required. No proposed or designated Mexican spotted owl “critical habitat” occurs within this allotment.	No
Black-footed ferret (<i>Mustela nigripes</i>)	Endangered	For Taos county, the black-footed ferret is listed as “Experimental population, non-essential”. The FWS had determined that if prairie dog towns are less than 200 acres in size there is no need to survey for black-footed ferrets. No prairie dog towns are located on the Angostura grazing allotment; therefore the black-footed ferret will not be addressed further in this document.	Yes
Southwestern willow flycatcher (<i>Empidonax traillii extimus</i>)	Endangered	Southwestern willow flycatcher nesting habitat is extensive dense patches of trees or shrubs near slow to still water (USDI 1997). Currently there is no potential or suitable habitat within the Angostura grazing allotment. No proposed or designated “critical habitat” for the southwestern willow flycatcher is located within this allotment. The Southwestern willow flycatcher will not be addressed further in this document.	Yes
Interior least tern (<i>Sterna antillarum</i>)	Endangered	The Biological Assessment for the Continued Implementation of the Land and Resource Management Plans for the 11 National Forests and National Grasslands of the Southwest Region (USDA 2004) determined that the Carson National Forest was not within the range of this species. The Interior least tern will not be addressed further in this document.	Yes

Mexican spotted owl – Threatened

The Recovery Plan for the Mexican Spotted Owl (USFWS 1995) summarizes the effects of livestock grazing on Mexican spotted owls in four broad categories: 1) altered prey availability, 2) altered susceptibility to fire, 3) degeneration of riparian plant communities and 4) impaired ability of plant communities to develop into spotted owl habitat.

Mexican spotted owls consume a variety of prey throughout their range but commonly eat small and medium sized rodents such as woodrats, mice (*Peromyscid*), and voles (*Microtine*). Spotted owls also consume bats, birds, reptiles, and arthropods. Regional differences in the owl's diet likely reflect geographic variation in population densities and habitats of both the prey and the owl (Ward and Block 1995).

There is approximately 5,054 acres of mixed conifer habitat on the Angostura allotment. It is not known how much of this would qualify as suitable habitat for Mexican spotted owls. The mixed conifer habitat occurs on two of the four pastures on the Angostura allotment. The Agua Sarca-Loring Spring pasture has 4,675 acres of mixed conifer, while the Lower Alamitos pasture contains the remaining 379 acres of mixed conifer.

Formal surveys following Regional protocol methodologies for the presence of this species have occurred on large portions of the forest since 1989. No Mexican spotted owls (MSO) have been documented on the Camino Real Ranger District. On the Carson National Forest, the only located MSO with established territories have been found occupying the Jicarilla Ranger District, approximately 90 air miles to the west of the allotment. Owls have been found on the adjacent ranger district to the southeast. The Pecos Ranger District, Santa Fe National Forest established MSO protected activity centers (PACs) approximately 11 miles from the Santa Barbara allotment (Keckler pers. comm.). Incidental surveys for MSO were conducted on the Angostura grazing allotment in 1990. Incidental surveys were also conducted on the adjacent Knob grazing allotment in 1990 and Angostura allotment in 1999 and 2000. All surveys yielded negative results for MSO.

Alternative A

Under this alternative there would be no new management activities. Livestock would not utilize the available forage. Eliminating grazing would remove any potential of noise and disturbance from grazing and associated permittee activity. It is anticipated that there would be an increased density of vegetative species such as shrubs, forbs, and grasses. Meadow encroachment would continue to occur. This increase in vegetation would be expected to enhance prey base for Mexican spotted owl.

No prescribed burning would be implemented in open meadows or grasslands to improve prey base habitat conditions by maintaining/enhancing meadows and forested openings or improve productivity of the herbaceous vegetation to create habitat diversity.

Alternative B

Under the proposed action the only substantive change from current management is the light to moderate intensity prescribed fire over 4 % of the allotment area. Range conditions would be expected to remain the same because grazing intensity would not change. Current range condition surveys show that grazing pressure is not excessive and pastures are mostly in a stable or upward

trend (table 5). The 2% of the allotment that is in a downward trend is due to forest encroachment, which is not a result of grazing pressure and not necessarily detrimental to MSO prey base. Range soil surveys further imply that the vegetative community across the allotment provides adequate cover. The ongoing range monitoring program has ensured stable utilization levels to maintain adequate pasture condition.

Grazing most likely impacts residual plant cover that provides regeneration, fruits, and seeds for MSO prey species. Utilization guidelines have resulted in light to conservative grazing intensity in MSO habitat, allowing for regeneration of trees and shrubs to maintain vegetative structure. The retention of residual plant cover to allow for prescribed fire, and the regeneration of trees and shrubs also plays an important role in protecting habitat. Current management in the allotment has resulted in conservative (<40%) grazing intensity levels.

Moving livestock drinkers out of the riparian area at Loring and Aqua Sarca springs would enhance riparian conditions and benefit MSO prey species. Voles, meadow jumping mice, and shrews are important prey species for Mexican spotted owls.

The prescribed fire plan within the allotment is for light to moderate burning of 789 acres within 19 burn units. This would include approximately 62 acres of grassland, 54 acres of Gambel oak, 64 acres of aspen, 84 acres of Douglas-fir, and 525 acres of spruce fir. The prescribed fire units are grasslands and forested openings in old timber sales with a young forest structural stage of less than 12" dbh which are not considered suitable MSO habitat but could be used for foraging. To minimize any potential impacts to the MSO, prescribe fire within suitable MSO nesting habitat (protected and restricted) would either be outside the breeding season (March 1 to August 31), or have protocol MSO surveys completed prior to implementation.

Cumulative Effects

The area considered for cumulative effects is the subwatershed level, consisting of the La Junta Canyon-Rio Pueblo and Vigil Creek-Mora. Past activities such as timber harvest, livestock grazing, recreation, small wood removal, prescribed fire, fire suppression, and wildfire have combined to create the current condition of habitat in the analysis area. The timber stands in the area have been affected by several past events within or adjacent to the analysis area. Past timber sales have created openings within dense thickets of mixed conifer stands. These openings increased grass and shrub availability for prey species for the MSO.

The proposed action combined with cumulative actions such as livestock grazing on adjacent allotments could decrease prey base cover habitat for the MSO. Managing the AOIs to adjust the livestock numbers, entry and exit dates, number of days and grazing system would assist in maintaining prey base habitat for these species. The proposed action would provide habitat for prey species for the MSO by retaining approximately 60% of the forage. However, in areas that have already lost plant diversity or have been converted to a grass system that will not support some prey species, this is likely to continue to affect the amount and diversity of prey species.

Fire suppression policies and reduced timber harvest have contributed to the loss of or limited the occurrence of forest openings and meadows reducing foraging capacity on the allotment. Aspen and conifer invasion is resulting in the decline of forage productivity of these meadows.

The proposed action combined with prescribed burning on adjacent allotments could decrease prey base cover habitat for the Mexican spotted owl. However, having the ability to manage the

timing of burns and burn intensity would assist in improving prey base habitat for these species. The proposed action would provide habitat for prey species for the Mexican spotted owl by increasing plant diversity.

Past and future activities have and will reduce fuel loading in the analysis area. However, there is still a chance that the area could experience a stand replacing wildfire. A stand replacing wildfire would incrementally result in the loss of MSO and prey species habitat.

Mitigation

To minimize any potential impacts to the MSO, prescribe fire within suitable MSO nesting habitat (protected and restricted habitat) would either be outside the breeding season (March to August 31), or would have protocol MSO surveys completed prior to implementation.

Forest Service Sensitive Terrestrial Animal and Plant Species

There are 32 terrestrial and plant species on the Regional Forester’s sensitive species list (September 21, 2007) that potentially occur on the Camino Real Ranger District, Carson National Forest (Keckler 2008a). The following is a list of those species. Species excluded will not be addressed further in this document. [62, 63]

Table 18. Forest Service sensitive terrestrial species for the Carson National Forest

Species	Habitat	Species Excluded	Justification
Northern goshawk <i>Accipiter gentiles</i>	Suitable nesting habitat is found in older aged forests with a high density of large trees, high tree canopy cover interspersed with small openings	No	Analysis required
American bald eagle <i>Haliaeetus leucocephalus</i>	Usually occurs in areas with large bodies of water with large trees to successfully nest and produce young. In the winter will use Rio Grande Gorge for winter roost sites.	Yes	May have an occasional eagle on allotment, but no known wintering sites. Grazing or burning would not affect habitat.
American peregrine falcon <i>Falco peregrinus anatum</i>	In NM, nests on cliffs that are in wooded/ forested habitats, with large nearby open areas or "gulfs" of air from which they can hunt. 3500-9000 ft.	Yes	Key habitat or species does not occur in analysis area. No further analysis required
Southern red-backed vole <i>Clethrionomys gapperi</i>	Most cool mesic sites within spruce-fir forest	No	Analysis required
Boreal owl <i>Aegolius funereus</i>	Species occupies high-elevation coniferous forest -- especially mature to old growth spruce-fir, made up of mature or older age	No	Analysis required

Species	Habitat	Species Excluded	Justification
	classes of Engelmann spruce and subalpine fir with some interspersing of meadows.		
White-tailed ptarmigan <i>Lagopus leucurus altipetens</i>	Alpine tundra and timberline habitat above 3200 m (10,500 ft) in NM.	No	Analysis required
Yellow-billed cuckoo <i>Coccyzus americanus</i>	Broad leaf riparian forests	Yes	Key habitat or species does not occur in analysis area. No further analysis required.
Burrowing owl <i>Athene cumicularia hypugaea</i>	Dry, open, shortgrass, treeless plains, often associated with burrowing mammals. Presence of nest burrow is a critical component	Yes	Key habitat or species does not occur in analysis area. No further analysis required
New Mexico meadow jumping mouse <i>Zapus hudsonicus luteus</i>	Preferred habitat consists of permanent streams supporting riparian areas with moderate to high soil moisture and dense and diverse streamside vegetation consisting of grasses, sedges, and forbs.	No	Analysis required
Rocky Mountain bighorn sheep <i>Ovis canadensis canadensis</i>	Inhabit cliffs and crags in tundra and alpine areas from summit peaks to around 200 m below tree line. Prefer precipitous terrain adjacent to suitable feeding sites of high mountain meadows. Found in areas where canopy cover is less than 25 to 30% and slopes are >60%.	No	Analysis required
Northern leopard frog <i>Rana pipiens</i>	Use a broad range of habitats due to their complicated life histories. Overwintering in lakes, streams, and ponds; summer habitat (feeding by adults in upland areas), and tadpole habitat (up to three months spent as tadpoles in shallow breeding ponds).	No	Analysis required
Nokomis fritillary <i>Speyeria nokomis nokomis</i>	Narrow endemic. Essential habitat components include wetlands associated with flowing water (i.e. springs, seeps, and wet meadows), an abundance of larval food plant (<i>Viola nephrophylla</i>), and availability of adult nectar sources (mostly composites). Streamside meadows with an abundance of	No	Analysis Required

Species	Habitat	Species Excluded	Justification
	violets.		
Cinereus (Masked) shrew <i>Sorex cinereus cinereus</i>	Hydrosere communities above 9,000 ft; riparian habitat with deep moist burrowing soils or duff.	No	Analysis Required
Dwarf shrew <i>Sorex nanus</i>	Various habitats including rocky areas in alpine tundra and partly into subalpine coniferous forest, other rock slopes, sedge marsh, subalpine meadow, dry brushy slope, arid shortgrass prairie, dry stubble fields and pinyon-juniper woodland.	No	Analysis Required
Water shrew <i>Sorex palustris navigator</i>	Occur in vicinity of permanent streams, 8,000+ ft. Usually found within 10 ft of water. Closely associated with water and dense streamside vegetation in subalpine coniferous forest.	No	Analysis Required
Spotted bat <i>Euderma maculatum</i>	Roost in crevices in cliffs or under loose rocks. Rocky areas seem to be an important element in habitat. Moths appear to be principle food. Inhabit ponderosa pine forest in June/July and wander to lower elevations in late summer and autumn.	Yes	Key habitat or species does not occur in analysis area. No further analysis required.
Pale Townsend's big-eared bat <i>Corynorhinus townsendii pallascens</i>	Hibernate in caves or mines where temperature is 12 degrees C (54 F) or less, but usually above freezing.	Yes	Key habitat or species does not occur in analysis area. No further analysis required.
Pika <i>Ochotona princeps</i>	Talus slopes and boulder fields in alpine and sub-alpine habitat.	Yes	Grazing or burning will not affect habitat.
Snowshoe hare <i>Lepus americanus</i>	Spruce-fir forests and its seral communities, where the animals inhabit dense stands.	Yes	Grazing or burning will not affect habitat.
Yellow-bellied marmot <i>Marmota flaviventris</i>	Need boulders for cover and lush herbage for food.	Yes	Grazing or burning will not affect habitat.
Gunnison's prairie dog <i>Cynomys gunnisoni</i>	Found to inhabit Great Basin desert scrub habitat in NM. Occurs in low valleys but also is common in parks and meadows in the montane forests up to at least 10,000 ft.	Yes	Key habitat or species does not occur in analysis area. No further analysis required

Species	Habitat	Species Excluded	Justification
Western heather vole <i>Phenacomys intermedius intermedius</i>	High altitudes ranging from 7,000 to 12,500 ft. Seems to prefer open coniferous forest with an understory of heaths or areas of shrubby vegetation on forest borders or in meadows.	No	Analysis required
Long-tailed vole <i>Microtus longicaudus</i>	Montane forest species, usually associated with meadows and forest edge. Most common in mixed coniferous and spruce-fir forest, descending into ponderosa pine forest along sheltered canyon sides.	No	Analysis required
American marten <i>Martes Americana origenes</i>	Optimum habitat appears to be mature old-growth spruce-fir communities with more than 30% canopy cover, well-established understory of fallen logs and stumps, and lush shrub and forb vegetation supporting microtine and sciurid prey.	No	Analysis required
Ermine <i>Mustela erminea murices</i>	Prefers wooded areas with thick understory near watercourses. Adapted to wide variety of habitats.	No	Analysis required
Mink <i>Mustela vison energumenos</i>	Riparian habitat.	No	Analysis required
Alpine larkspur <i>Delphinium alpestre</i>	Alpine tundra and open meadows in subalpine coniferous forest; 11,500-13,000 ft.	No	Analysis required
Yellow lady-slipper <i>Cypripedium parviflorum var. pubescens</i>	Grows in boggy areas, swampy areas, damp woods (often with a rich layer of humus and decaying leaf litter), near rivers or canal banks.	No	Analysis required
Robust larkspur <i>Delphinium robustum</i>	Canyon bottoms and aspen groves in lower and upper montane coniferous forest; 7,200-11,200 ft. In NM, is found in meadows between 6,890-8,530 ft.	No	Analysis required
Pecos fleabane <i>Erigeron subglaber</i>	Rocky, (generally greater than 50% exposed rock) open meadows in subalpine coniferous forest; 10,000-11,500 ft.	No	Analysis required
Arizona willow <i>Salix arizonica</i>	Sedge meadows and wet drainage ways in subalpine coniferous forest; 10,000 – 11,200 ft	No	Analysis required

Northern Goshawk

Breeding, roosting, and foraging habitat does occur on the allotment within the mixed conifer and ponderosa pine forests. No surveys have been conducted within the allotment, but incidental surveys were conducted over areas adjacent to the northwest side of the allotment in 1991, 1992, 1993, and 1994 for goshawk. No nests were found and none are known to occur on the allotment.

Alternative A

Under this alternative there would be no new management activities. Livestock would not utilize the available forage. Eliminating grazing would remove any potential of noise and disturbance from grazing and permittee activity. It is anticipated that there would be an increased density of vegetative species such as shrubs, forbs, and grasses. Meadow encroachment would continue to occur. This increase in vegetation would be expected to enhance prey base for goshawk.

No prescribed burning would be implemented in open meadows or grasslands to improve prey base habitat conditions by maintaining/enhancing meadows and forested openings or improve productivity of the herbaceous vegetation to create habitat diversity.

Alternative B

Grazing within the allotment may impact individuals but would not cause a trend toward federal listing or cause a decrease in overall species populations. With rotation of grazing pastures and range riders to better distribute cattle grazing there would be improvements to riparian vegetation within the allotment, thereby providing potential to improve prey diversity for goshawk. Since goshawks typically nest high in larger trees, cattle grazing through an area would be unlikely to create disturbance to nest sites. Permittee activity (movement and noise), depending on distance from nest site and duration and intensity of disturbance, could disturb nesting behavior. Grazing effects on vegetation structure and composition could reduce abundance or variety of prey species in localized areas, but would not have impacts over large areas. Grazing would have no effect on canopy cover levels, and thus, there would be no change in existing vegetation structural stages.

Construction of proposed range improvements would create noise and activity disturbance. Goshawk surveys, for mitigation during the breeding season (March 1 to September 30) would eliminate potential for impacts to nest sites. The improvement in livestock distribution would lead to adequate forage utilization levels and range condition to support goshawk habitat.

The prescribed fire plan within the allotment is for light to moderate burning of 789 acres within 19 burn units. With a low intensity ground fire, canopy closure would not be expected to change from current condition. With a moderate intensity fire, the objective would be to reduce encroachment on meadows and within forest openings so canopy cover would be expected to change to a grass and forb stage. No burning would occur within 100 feet of perennial streams or within 50 feet of intermittent streams, seeps, springs or permanent wetlands.

The implementation of alternative B has potential to impact individual goshawk. However, it would not have a measurable negative effect to their populations.

Mitigation Measures

Proposed construction planned within potential or suitable habitat should occur October 1 through February 28 to avoid disturbance during breeding season. If goshawk surveys were done in

May/June at each project site and were negative for response, then construction at that site could proceed with no seasonal restrictions.

Boreal owl

The boreal owl occurs primarily above 9,515 feet in climax spruce-fir forests (BISON-M), and subalpine fir/Engelmann spruce, and transition forest within 100 m of these forests (Hayward and Hayward 1993). Boreal owls use similar habitats during all seasons except during nomadic movements. Nest sites are typically located in mature and older forest stands. Clutches are initiated as early as March and as late as June (Hayward and Hayward 1993).

Alternative A

Under this alternative, there would be no new management activities. Livestock would not utilize the available forage. Therefore, it is anticipated that there would be an increase in density of the vegetative species such as shrubs, forbs, and grasses and meadow encroachment would continue to occur. Boreal owl would benefit by increasing habitat utilized by their prey base such as voles.

Alternative B

With rotation of grazing pastures and range riders to better distribute cattle grazing there would be improvements of riparian vegetation within the allotment thereby providing potential to improve prey diversity for owl. Breeding season is February – June so there would be no disturbance associated with cattle grazing or permittee activity. Grazing effects on vegetation structure and composition could reduce abundance or variety of prey species in localized areas, but would not have impacts over large areas. Grazing would have no effect on canopy cover levels, and thus, there would be no change in existing vegetation structural stages.

Construction of proposed range improvements would create noise and activity disturbance. The improvement in livestock distribution would ultimately lead to adequate forage utilization levels and range condition to support owl habitat.

Fire activity, depending on distance from nest site, timing of burn, and duration and intensity of disturbance could disrupt nesting behavior. Low-intensity ground fires prevent fuel accumulation, stimulate nutrient cycling, promote grasses and forbs, discourage shrubs and trees, and perpetuate the patchiness that supports small mammal diversity (USDA 2005). This would benefit the boreal owl by increased exposure and temporary loss of food and cover for prey species. The implementation of alternative B has potential to impact individual boreal owls. However, it would not have a measurable negative effect to their populations.

White-tailed Ptarmigan

White-tailed ptarmigan primarily inhabit alpine ecosystems at or above treeline. They also use streamsidings and meadows within the subalpine zone. The two most important habitat features are the presence of willow and rocky areas (USDA 2007). White-tailed ptarmigan are present on the allotment. Several ptarmigan were observed in the alpine habitat above Serpent Lake.

Alternative A

Implementation of this alternative would not change Forest-wide habitat or population trends and would benefit ptarmigan for the long term.

Alternative B

Although livestock rarely venture into the area where suitable ptarmigan habitat exists, trampling of nests by ungulates is a possibility. No disturbance would be associated with prescribed fire as no burning would occur within ptarmigan habitat. The closest prescribed fire unit is over 5 miles away. Implementation of this alternative would not change Forest-wide habitat or population trends and would benefit ptarmigan for the long term.

New Mexico Meadow Jumping Mouse

This species is considered to be an extreme habitat specialist that relies on riparian areas that have tall, dense herbaceous vegetation, especially sedges, on perennially moist soil (Frey 2006). They inhabit the narrow zones of thick grasses, forbs, willows and sedges along permanent streams, and wet meadows (Finch 1992, Morrison 1992, Zwank et al. 1997). Tall dense sedge on moist soil appears to be the key microhabitat utilized by New Mexico meadow jumping mouse, regardless of the community type.

Recreational development and range management activities in montane areas have the potential to affect isolated populations of the New Mexico meadow jumping mouse (Morrison 1992, Frey 2006). Removal of tall dense sedge habitat by either livestock or other ungulates (ie. elk) can remove habitat components for the mouse.

Alternative A

Under this alternative, there would be no new management activities. Livestock would not utilize the available forage. Therefore, it is anticipated that there would be an increase in density of the vegetative species such as shrubs, forbs, and grasses and meadow encroachment would continue to occur. The increased growth of these various vegetative species would improve range conditions, thus improve the habitat for the New Mexico meadow jumping mouse.

Alternative B

Pasture rotation, salting, limited grazing, and relocating drinkers out of riparian areas onto drier sites would reduce riparian impacts and improve range distribution of cattle. Riparian vegetation would be expected to increase somewhat under this alternative. Any suitable habitat present would continue to be grazed, with no potential for improvement/expansion of potential habitat. Surface nests are susceptible to trampling by livestock. Proper herding of livestock and reducing cattle use of streamside habitat for extended periods could increase the quality of riparian zones by increasing the woody vegetation and thus ensuring good streambank stability. Prescribed burning would have no effect on jumping mouse habitat as no burning would occur within 100 ft of perennial streams or within 50 ft of intermittent streams, seeps, springs or permanent wetlands. The implementation of alternative B has potential to impact individual New Mexico meadow jumping mice, however, it would not have a measurable negative effect to their populations.

Rocky Mountain Bighorn Sheep

Rocky Mountain bighorn sheep is an indicator species for the presence of alpine, subalpine tundra, and mountain meadow grassland. The amount of Rocky Mountain bighorn sheep habitat on the Carson NF has not changed from 1986 to 2005, and is 20,430 acres (USDA 2007). The MIS Assessment for the Carson National Forest (USDA 2007) states that the population of Rocky Mountain bighorn sheep is on an upward trend using the best available information.

Alternative A

Implementation of this alternative would not change forest-wide habitat or population trends. It is anticipated that there would be an increase in density of vegetative species such as shrubs, forbs, and grasses. Over time this alternative would increase forage for bighorn sheep and improve year-round habitat.

Alternative B

Livestock rarely venture into the alpine area where bighorn sheep habitat exists. There is a low potential for competition between cattle and the bighorn sheep for the available forage.

Northern Leopard Frog

The Northern leopard frog is typically associated with streams and rivers, although lakes, marshes and irrigation ditches are also occupied. In New Mexico they occur at elevations of about 3,500 to 11,000 feet. Their habitats include cattail marshes, beaver ponds and other water sources with aquatic vegetation. In New Mexico this species is known in a large area in the northern and western part of the state and along the entire length of the Rio Grande Valley. The leopard frog is considered widespread on the Carson National Forest (BISON-M).

Alternative A

Under this alternative, there will be no new management activities. Elimination of grazing would remove any risk factors to the frog such as trampling and the degradation of life stage habitat and water quality caused by livestock grazing. With elimination of grazing, vegetation in the riparian corridor would be expected to increase, providing improved cover habitat for amphibians.

Alternative B

There could be some localized impacts to individuals through livestock trampling of vegetation, soil compaction, and concentrated heavier utilization in riparian areas by ungulates. These impacts would not be expected to cause a decline in populations or a trend toward federal listing. There could be some direct impacts to individuals, young or eggs with cattle moving through wet areas and entering streams or other water sources. Implementation of alternative B has potential to impact individual leopard frogs. However, it would not have a measurable negative effect to their populations.

Mitigation Measures

All water troughs should be designed with exit ramps so that any small wildlife can escape.

Nokomis Fritillary Butterfly

Nokomis fritillary butterfly is found in streamside meadows (Selby 2007) and open seepage areas in generally arid landscapes. Presence of bog violet (*Viola nephrophylla*) is an essential habitat component for the butterfly. The main threat to *S. nokomis* is loss of habitat, primarily due to wetland drainage and spring capping (Pyle 1976; Stanford 1993), but also natural hydrological disturbances (Pyle 1976). Habitat loss through heavy grazing is a primary concern.

Alternative A

Under this alternative, there would be no new management activities. Livestock would not utilize the available forage. Therefore, it is anticipated that there would be an increase in density of the vegetative species such as shrubs, forbs, and grasses and meadow encroachment would continue to occur. This alternative would eliminate any related risk factors to the Nokomis fritillary such as the short-term reduction of nectar availability and vegetation cover. No long-term impacts such as soil compaction and the reduction of water infiltration that leads to the loss of larval host plants.

Alternative B

Local heavy grazing could occur along riparian zones but impacts should be reduced with pasture rotation, limited grazing, relocating water sources out of riparian areas onto drier sites, range riders moving cattle around and salting. Utilization guidelines have resulted in light to conservative grazing intensity across the allotment. Current management in the allotment has resulted in conservative (<40%) grazing intensity levels. The implementation of alternative B has potential to impact individual Nokomis fritillary. However, it would not have a measurable negative effect to their populations.

Cinereus (Masked) Shrew

Masked shrews are considered to be indigenous in the counties of Colfax, Mora, Rio Arriba, Sandoval, San Miguel, Santa Fe, and Taos of New Mexico (Findley 1975). Within these counties *S. cinereus* is restricted to riparian areas above 9,500 feet elevation in the Sangre de Cristo, Jemez, San Juan, and possibly the Mogollons mountain chains (NatureServe). Grazing is one of the management activities that result in the loss of vegetation in this species' habitat. Trampling in these moist areas can cause soil compaction there by reducing water level of the areas and changing plant composition. Trampling also degrades the moist deep soil needed for burrowing by masked shrew. Grazing by both livestock and wildlife can alter function and composition of moist areas through trampling and reduction in height and density of vegetation.

Alternative A

Under this alternative, there would be no new management activities. Livestock would not utilize the available forage. Therefore, it is anticipated that there would be an increase in density of the vegetative species such as shrubs, forbs, and grasses and meadow encroachment would continue to occur. The increased growth of these various vegetative species would improve range conditions, thus improve food and cover for the masked shrew.

This alternative would eliminate any direct and indirect risk factors to the masked shrews, such as trampling in moist terrestrial habitat required by masked shrews.

Alternative B

Pasture rotation, salting, limited grazing, and relocating drinkers out of riparian areas onto drier sites would reduce riparian impacts. Riparian vegetation would be expected to increase under this alternative. Any suitable habitat present would continue to be grazed, with no potential for improvement/expansion of potential habitat. Proper herding of livestock and reducing cattle use of streamside habitat for extended periods could increase the quality of riparian zones by increasing the woody vegetation and thus ensure good stream bank stability. The implementation of alternative B has potential to impact individual masked shrews; however, livestock grazing and prescribed burning would not have a measurable negative effect to their populations.

Dwarf Shrew

This shrew lives in white fir-Douglas fir zone from about 7,000 to 9,000 feet. The preferred habitat is talus and other rocky areas primarily in sub-alpine coniferous forest (Findley, 1975).

Alternative A

Under this alternative, there would be no new management activities. Livestock would not utilize the available forage. Therefore, it is anticipated that there would be an increase in density of the vegetative species such as shrubs, forbs, and grasses and meadow encroachment would continue to occur. The increased growth of these various vegetative species would improve range conditions, thus improve the habitat for the dwarf shrew.

Alternative B

BISON-M notes that dwarf shrew is tolerant to grazing activities. These activities would not be expected to have an impact on this species or habitat. The proposed burns are expected to remove and/or reduce fuels on the forest floor, a necessary component for dwarf shrews. The implementation of alternative B has potential to impact individual dwarf shrews. However, would not have a measurable negative effect to their populations.

Water Shrew

In New Mexico water shrews are confined to the Sangre de Cristo, San Juan, and Jemez mountains where they occur in the vicinity of permanent streams, seldom descending below 8,000 feet in altitude.

Alternative A

Under this alternative, there would be no new management activities. Livestock would not utilize the available forage. Therefore, it is anticipated that there would be an increase in density of the vegetative species such as shrubs, forbs, and grasses and meadow encroachment would continue to occur. This alternative would eliminate any related risk factors to the water shrew such as trampling and the degradation of aquatic habitat and water quality caused by livestock grazing.

Alternative B

Grazing is a management activity that results in the loss of vegetation in this species' habitat. Trampling in these moist areas can cause soil compaction, thereby reducing water levels and

changing plant composition. Grazing by both livestock and wildlife can alter function and composition of moist areas through trampling and reduction in height and density of vegetation.

Pasture rotation, salting, limited grazing, and relocating drinkers out of riparian areas onto drier sites would reduce riparian impacts and decrease range distribution of cattle. Riparian vegetation would be expected to increase somewhat under this alternative. Any suitable habitat present would continue to be grazed, with no potential for improvement/expansion of potential habitat. Proper herding of livestock and reducing cattle use of streamside habitat for extended periods could increase the quality of riparian zones by increasing the woody vegetation and thus ensuring good stream bank stability. Surface nests are susceptible to trampling by livestock.

Prescribed burning would have no effect on shrew habitat as no burning would occur within 100 ft of perennial streams or within 50 ft of intermittent streams, seeps, springs or permanent wetlands. The implementation of alternative B has potential to impact individual water shrews. However, it would not have a measurable negative effect to their populations.

Southern Red-backed Vole

Southern red-backed vole are often common in mature lodgepole pine stands or in mixed spruce-fir forests with good cone production and an abundance of surface litter including stumps, logs, and exposed roots of fallen trees. Other habitats include grassy meadows, riparian willow thickets, talus, and krummholz (Fitzgerald et al.1994, Frey 1995). This vole is found in the Sangre de Cristo Mountains over 10,000 feet in elevation (BISON-M).

Alternative A

Under this alternative, there would be no new management activities. Therefore, it is anticipated that there would be an increase in density of the vegetative species such as shrubs, forbs, and grasses. Meadow encroachment would continue to occur. The increased growth of these various vegetative species would improve range conditions, thus improving the habitat for the Southern red-backed vole. This alternative would eliminate any related risk factors to the Southern red-backed vole such as trampling.

Alternative B

Grazing by both livestock and wildlife can alter function and composition of moist areas through trampling and reduction in height and density of vegetation. Grazing would be maintained at current level; there would be range maintenance to improve range distribution of cattle. Any suitable habitat present would continue to be grazed, with no potential for improvement or expansion of potential habitat. Pasture rotation, salting, limited grazing, and relocating drinkers out of riparian areas onto drier sites would reduce riparian impacts. Riparian vegetation would be expected to increase somewhat under this alternative. Fire may result in vole fatalities, although the risk is low in a slow moving prescribed fire as individuals can retreat from the area or underground. The implementation of alternative B has potential to impact individual Southern red-backed vole. However, it would not have a measurable negative effect to their populations.

Western Heather Vole

Western heather voles are known to occur in mountains near or above the timberline. In New Mexico, The Western heather vole is found in the Sangre de Cristo and San Juan mountains at high elevations from 7,000 to 12,500 feet (BISON-M).

Alternative A

Under this alternative, there would be no new management activities. Livestock would not utilize the available forage. Therefore, it is anticipated that there would be an increase in density of the vegetative species such as shrubs, forbs, and grasses and meadow encroachment would continue to occur. The increased growth of these various vegetative species would improve range conditions, thus improve the habitat for the western heather vole. This alternative would eliminate any related risk factors to the western heather vole such as trampling

Alternative B

Grazing is a management activity that results in the loss of important vegetation in this species' habitat. Pasture rotation, salting, limited grazing, and relocating drinkers out of riparian areas onto drier sites would reduce riparian impacts and improve range distribution of cattle. Riparian vegetation would be expected to increase somewhat under this alternative. Any suitable habitat present would continue to be grazed, with no potential for improvement/expansion of potential habitat. Proper herding of livestock and reducing cattle use of streamside habitat for extended periods could increase the quality of riparian zones by increasing the woody vegetation and thus ensure good stream bank stability. Individual voles in the nest could be killed if they are located within a burn unit during operations. Nests are located above ground in the winter and made of flammable material such as lichen, twigs and grasses. No burning would occur within 100 ft of perennial streams or within 50 ft of intermittent streams, seeps, springs or permanent wetlands. The implementation of alternative B has potential to impact individual Western heather voles. However, it would not have a measurable negative effect to their populations.

Long-tailed Vole

This species is associated with riparian areas, montane meadows, and forest edge (Frey 2003). The elevation range generally extends from the bottom edge of the mixed conifer zone to well above timberline. In New Mexico, long-tailed voles require water for daily sustenance (BISON-M).

Alternative A

Under this alternative, there would be no new management activities. Livestock would not utilize the available forage. Therefore, it is anticipated that there would be an increase in density of the vegetative species such as shrubs, forbs, and grasses and meadow encroachment would continue to occur. The increased growth of these various vegetative species would improve range conditions, thus improving the habitat for the long-tailed vole.

Alternative B

Frey (1995) reported that this species is largely dependent on well-developed mesic meadows and that grazing negatively impacts this species. Pasture rotation, salting, limited grazing, and

relocating drinkers out of riparian areas onto drier sites would reduce riparian impacts and decrease range distribution of cattle. Riparian vegetation would be expected to increase somewhat under this alternative. Proper herding of livestock and reducing cattle use of streamside habitat for extended periods could increase the quality of riparian zones by increasing the woody vegetation and thus ensure good stream bank stability. It is anticipated that mortality would not occur as voles would retreat to underground burrows. No burning would occur within 100 ft of perennial streams or within 50 ft of intermittent streams, seeps, springs or permanent wetlands. The implementation of alternative B has potential to impact individual long-tailed voles. However, it would not have a measurable negative effect to their populations.

Mitigation Measures

All water developments should be designed with exit ramps so that any small wildlife can escape.

American Marten

Optimum habitat for marten appears to be mature, old-growth spruce-fir communities with more than 30 percent canopy cover, well-established understory of fallen logs and stumps, and lush shrub and forb vegetation supporting microtine and sciurid prey (BISON-M). Current research indicates martens are adaptable to human presence. Marten attraction to human structures has been observed because mice and voles also take advantage of cover and forage found in and adjacent to structures. Surveys were conducted on the Forest for the presence of marten from 1997 to 2001. Marten were found in the Middle Fork of the Rio Santa Barbara drainage.

Alternative A

The implementation of alternative A would benefit the marten by increasing the habitat for prey base such as voles. Habitat would increase by increasing the density of the vegetative species such as shrubs, forbs, and grasses within the montane meadows/grassland and spruce-fir edge habitat. The improvement in graminoid composition and vigor would increase residual stubble heights of grass plants that benefit prey species such as voles.

Alternative B

Grazing is a management activity that results in the loss of vegetation used by the prey of this species. Pasture rotation, salting, limited grazing, and relocating drinkers out of riparian areas onto drier sites would reduce riparian impacts and decrease range distribution of cattle. Riparian vegetation would be expected to increase somewhat under this alternative. Any suitable habitat present would continue to be grazed, with no potential for improvement/expansion of potential habitat for prey species. Fires that create a mosaic of diverse habitats provide the best cover for marten and their prey in the long-term (BISON-M). Fire can create and maintain openings where abundant fruits, insects, ground squirrels, and voles provide summer food (BISON-M). The implementation of alternative B has potential to impact individual marten. However, it would not have a measurable negative effect to their populations.

Ermine

The ermine is a weasel of high altitudes (7,800-11,000 feet) in northern New Mexico, found in association with small rodent populations in montane meadows. It avoids dense forest. The species occurs on the Forest within Taos, Colfax, and Rio Arriba Counties. Because they associate

with meadows in forests, ermines probably are vulnerable to the effects of livestock grazing on vegetation. Small mammal prey may be secondarily affected. Encroachment of trees into meadows due to fire suppression may also reduce ermine habitat (Buskirk, et al, 2003).

Alternative A

Under this alternative, there would be no new management activities. Livestock would not utilize the available forage. Therefore, it is anticipated that there would be an increase in density of the vegetative species such as shrubs, forbs, and grasses and meadow encroachment would continue to occur. The increased growth of these various vegetative species would improve range conditions, thus improve the habitat for ermine prey base species such as small rodents.

Alternative B

Grazing is a management activity that results in the loss of vegetation used by the prey of this species. Pasture rotation, salting, limited grazing, and relocating drinkers out of riparian areas onto drier sites would reduce riparian impacts and decrease range distribution of cattle. Riparian vegetation would be expected to increase somewhat under this alternative. Any suitable habitat present would continue to be grazed, with no potential for improvement/expansion of potential habitat for prey species.

Prescribed fire would discourage meadow encroachment by trees, providing additional habitat for ermine. Low-intensity ground fires prevent fuel accumulation, stimulate nutrient cycling, promote grasses and forbs, discourage shrubs and trees, and perpetuate the patchiness that supports small mammal diversity (USDA 2005). The implementation of alternative B has potential to impact individual ermine. However, it would not have a measurable negative effect to their populations.

Mink

Primary mink habitat is shallow waterways or wetlands (with open water) that have plenty of cover and food. The diet is typically comprised of fish, amphibians (mostly frogs), crustaceans, muskrats, and small mammals (rabbits and mice) (Lariviere 1999). Mink will use low quality habitat if prey are abundant (Loukmas and Halbrog 2001). These waters must have thick riparian brush, shrubs, trees, or tall grass for protection from predators and den sites (Allen 1986). Mink prefer small streams with an abundance of downfall or debris for cover and pools for foraging.

Grazing may not only effect the cover for this species, but it also been noted that mink do not establish dens along shorelines that have been heavily grazed (Allen 1986).

Alternative A

Under alternative A, livestock grazing would not occur within the allotment. Therefore, it is anticipated that there would be an increase in density of the vegetative species near riparian waterways that provide cover for mink and mink prey base. Without livestock grazing, there is less probability that livestock would cave in mink dens as a result of trampling near shorelines.

Alternative B

Pasture rotation, salting, limited grazing, and relocating drinkers out of riparian areas onto drier sites would reduce riparian impacts and improve range distribution of cattle. Riparian vegetation would be expected to increase somewhat under this alternative. Proper herding of livestock and reducing cattle use of streamside habitat for extended periods could increase the quality of riparian zones by increasing the woody vegetation and thus ensure good stream bank stability.

The implementation of alternative B has potential to impact individual mink. However, it would not have a measurable negative effect to their populations.

Alpine Larkspur

Habitat for alpine larkspur includes alpine tundra and open meadows in subalpine coniferous forest; 11,500-13,000 ft. The remote and relatively inaccessible habitats of this species provide it with a large degree of protection from land use impacts. Some species of Delphinium are poisonous to cattle (NM RPD).

Alternative A

Under alternative A, the existing grazing permits would be cancelled and additional permits would not be issued. This alternative would eliminate any potential effects to the alpine larkspur caused by grazing or trampling by livestock.

Alternative B

Grazing seldom occurs at that elevation and this plant would be avoided by cattle. No burning would occur at that elevation. Grazing or trampling by livestock would be unlikely, hence this alternative would cause no effect.

Yellow Lady-slipper

Yellow lady-slipper grows in boggy areas, swampy areas, damp woods (often with a rich layer of humus and decaying leaf litter), near rivers or canal banks. It has also been found in rocky wooded hillsides on north or east facing slopes, wooded loess river bluffs, and moist creek sides or swales in spruce zones (NatureServe). In New Mexico, it has been found on east to northeast aspects. The elevation range in the southwest is considered to be 6,000-9,560 feet. Activities that cause habitat loss are the greatest risks to this plant. Some management activities, such as plant collecting and livestock grazing, may cause direct damage to plants while other activities indirectly impact plants by altering their habitat.

Alternative A

Under alternative A, the existing grazing permits would be cancelled and additional permits would not be issued. This alternative would eliminate any potential effects to the yellow lady-slipper caused by grazing or trampling by livestock.

Alternative B

Under alternative B, the condition of riparian vegetation, including lady-slipper habitat, would be expected to be maintained or improved (see watershed section). No burning would occur within 100 feet of perennial streams or within 50 feet of intermittent streams, seeps, springs, or permanent wetlands, thus prescribed burning under this alternative would not affect the lady-slipper. Implementation of alternative B has potential to impact individual yellow lady-slipper; however, it would not have a measurable negative effect to their populations.

Robust Larkspur

Found in canyon bottoms and aspen groves in lower and upper montane coniferous forest; 7,200-11,200 ft. The distribution of robust larkspur is not known on the Forest but potentially could be on all of the Carson NF Ranger Districts except the Jicarilla RD.

Alternative A

Under alternative A, the existing grazing permits would be cancelled and additional permits would not be issued. This alternative would eliminate any potential effects to the robust larkspur caused by grazing or trampling by livestock.

Alternative B

Prescribed burning or livestock grazing may maintain suitable habitat for this species or negatively impact existing occurrences, depending on the disturbance intensity, frequency, and type. Any suitable habitat present would continue to be grazed, with no potential for improvement/expansion of potential habitat. Pasture rotation, salting, limited grazing, and relocating drinkers out of riparian areas onto drier sites would reduce riparian impacts. The implementation of alternative B has potential to impact individual robust larkspur. However, it would not have a measurable negative effect to their populations.

Pecos Fleabane

Found in rocky (50% or more exposed slope), open meadows in subalpine coniferous forest; 10,000-11,500 feet in elevation. Habitat loss through recreationists (hikers, horsemen, or bikers), timber harvest, road and facilities construction, and grazing have the greatest risks to fleabane.

Alternative A

Alternative A, with no livestock grazing, would eliminate any potential effects to the Pecos fleabane caused by grazing or trampling by livestock.

Alternative B

The Pecos fleabane occurs in rocky and open sub-alpine slopes. This habitat corresponds with the Carson National Forest Terrestrial Ecosystem Units (TEU) 340 and 341. These TEU's are only found in the Pecos Wilderness within the project area. These areas are rarely grazed by domestic livestock. Impacts from bighorn sheep are beyond the scope of this project. The implementation of alternative B has potential to impact individual Pecos fleabane. However, it would not have a measurable negative effect to their populations.

Arizona Willow

Generally this willow is found along riparian corridors or in high elevation cienegas, and sedge meadows within subalpine conifer forests, where the soils are saturated for part of the year and water is in close proximity (0.5-1.0 m) of the soil surface. Plants are impacted by livestock and wildlife browsing, water impoundments and diversions, roads, recreation, development and maintenance of ski resort facilities, disease, alteration of natural hydrologic regimes, changes in the riparian community species composition and structure, and invasion of non-native vegetation. Arizona willow has been documented to occur on the Camino Real Ranger District, although previous surveys did not locate it within the Angostura Allotment.

Alternative A

This alternative would benefit Arizona willow as livestock would not browse on any available plants. If Arizona willow were present, it is anticipated that there would be an increase in density of not only this vegetative species but also other species of shrubs, forbs, and grasses.

Alternative B

Livestock grazing and trampling may cause direct damage to individual plants. Any suitable habitat present would continue to be grazed, with limited potential for improvement/expansion of potential habitat. The implementation of alternative B has potential to impact individual Arizona willow. However, it would not have a measurable negative effect to their populations.

Mitigation Measures

Analyze newly-discovered populations of Arizona willow, if found, to determine whether or not it would be beneficial to construct ungulate exclosures to maintain a healthy, stable or expanding population.

Cumulative Effects on Forest Service Sensitive Terrestrial Animal and Plant Species

The cumulative effects caused by alternative B on northern goshawk would retain the vegetation diversity that currently exists in the short term with an increase in forested sites in the long term. Livestock grazing would have no effect on the nesting, breeding, or foraging of the goshawk. Fence construction could have a temporary effect, but following construction would have a beneficial effect through better livestock distribution.

Other uses that would be considered for cumulative effects when combined with grazing would be those that would impact springs, streams, and wet areas. Hiking trails cross streams, but have point of impact in only a few areas; therefore potential for impacts would be limited. Recreational activities in and through wet areas and streams could be a factor in impacts to leopard frog eggs and young. These impacts would not be expected to cause a decline in populations or a trend to federal listing.

Beyond the direct and indirect effects associated with proposed activities under alternative B, there are no activities that are reasonably certain to occur within the allotment that would result in cumulative effects to habitat for boreal owl, white-tailed ptarmigan, New Mexico meadow jumping mouse, Rocky Mountain bighorn sheep, Nokomis fritillary butterfly, dwarf shrew, water

shrew, southern red-backed vole, western heather vole, American marten, long-tailed vole, ermine, and mink.

In addition to grazing activities, habitat loss through recreation activities (hikers, horsemen, or plant collectors) has the potential to affect isolated populations of alpine larkspur and fleabane and Arizona willow. These activities directly and indirectly impact plants by removing plants or altering their habitat. Habitat loss through recreation use, timber harvest, road and facilities construction, and grazing are the greatest risks to yellow lady-slipper and robust larkspur. Livestock grazing may cause direct damage to plants, while other activities indirectly impact plants by altering their habitats. These impacts would not be expected to cause a decline in yellow lady-slipper, robust larkspur alpine larkspur and fleabane, or Arizona willow populations or a trend to federal listing.

Management Indicator Species

The Carson National Forest Plan (USDA 1986) identified 11 fauna species as management indicator species (MIS) to monitor the conditions of the forest's ecosystems. The general habitat requirements for each MIS species are described in the Management Indicator Species Assessment for the Carson National Forest (USDA 2007). [16] The MIS species and specific indicator habitat associations they represent are shown in table 19.

Two of the species, resident fish and macroinvertebrates, are discussed in the Aquatics section of this assessment. Of the remaining nine fauna MIS, two were determined to have either no habitat in the analysis area, or no effect from the alternatives. These are the Brewer's sparrow and the Plain (juniper) titmouse. The remaining seven species were found to have the potential of being affected by implementation of continued grazing and prescribed burning on the allotment and were evaluated in detail.

Table 19 – Management Indicator Species (MIS) Species Considered for Angostura Allotment

MIS	Key Habitat Component for Quality Habitat	Forest Plan Management Areas	Habitat Present	Comments
Elk	general forest	MA 4 - Ponderosa Pine <40% MA 8 – Piñon-Juniper MA 14 - Riparian	Yes	Grazing and fire may have an effect on habitat. Fire would be beneficial to habitat.
White-tailed ptarmigan	alpine tundra and subalpine deciduous shrub	MA 9 – High elevation grassland	Yes	See FS sensitive species section for discussion.
Rocky Mountain bighorn sheep	alpine, subalpine tundra and mountain meadow grassland	MA 9 – High elevation grassland	Yes	See FS sensitive species section for discussion.
Brewer's sparrow	sagebrush	MA 12 - Sagebrush	No	No habitat in the allotment.
Plain (juniper) titmouse	piñon-juniper canopies	MA 8 – Piñon-juniper	Yes	Grazing would not affect habitat. Fire would not occur within habitat.

MIS	Key Habitat Component for Quality Habitat	Forest Plan Management Areas	Habitat Present	Comments
Abert's squirrel	interlocking canopies in ponderosa pine	MA 4 - Ponderosa Pine <40% MA 5 - Mixed Conifer & Ponderosa Pine >40% MA 7 - Unsuitable Timber	Yes	Grazing would not affect habitat. Fire would be beneficial to habitat.
Hairy woodpecker	snags	MA 1 – Spruce-fir <40% MA 3 – Mixed Conifer <40% MA 4 - Ponderosa Pine <40% MA 5 - Mixed Conifer & Ponderosa Pine >40% MA 6 – Aspen MA 7 - Unsuitable Timber MA 14 - Riparian	Yes	Grazing would not affect habitat. Fire would be beneficial to habitat.
Red squirrel	mixed conifer	MA 3 – Mixed Conifer <40% MA 5 - Mixed Conifer & Ponderosa Pine >40% MA 6 – Aspen MA 7 - Unsuitable Timber	Yes	Grazing would not affect habitat. Fire would be beneficial to habitat.
Wild turkey	old growth pine	MA 3 – Mixed Conifer <40% MA 4 - Ponderosa Pine <40% MA 5 - Mixed Conifer & Ponderosa Pine >40% MA 7 - Unsuitable Timber	Yes	Grazing and fire would be beneficial to habitat.

Elk

Elk is an indicator species for the general forest condition. Based on the inclusion of sagebrush, elk habitat has increased across the Carson National Forest from 1,362,760 acres in 1986 to 1,424,074 acres in 2002 or 4 % forest-wide (USDA 2007). The entire Angostura Allotment (17,716 ac) is elk habitat and they are present on the allotment. During the spring, summer, and fall months, elk use grassy meadows or forest openings near permanent water sources, in the winter they move down to lower elevations. Calving areas are generally found at 8,000-9,500 feet and occur on slopes of less than 15%, having a mix of brushy and forest openings, located in the upper elevation edges of winter ranges (Boyd 1978). Elk are known to calve within the Angostura Allotment. The most suitable elk calving areas exist on the north/northeast aspect of forested stands near drainages and small openings that are in close proximity to water.

On the Carson National Forest, the majority of elk habitat is in a mid-seral condition with a lack of widely distributed understory forage in the forested types. This results in increased competition between numerous species of wildlife and livestock in key pastures. Increasing elk populations have contributed to higher utilization levels on important foraging areas such as meadows and riparian areas. The same sites are also key livestock grazing areas. The decline in timber practices, continued fire suppression, and increase in canopy closure and duff layers are reducing understory forage production in the forested types on the Carson National Forest (USDA 2007).

Overall, habitat condition and trend for elk on the forest is considered fair and stable. A downward trend is likely on high index sites, where there is rapid forest succession and recent project work, such as thinning and prescribed burning, have occurred (USDA 2007). In the long term, quality habitat for elk is dependent on projects specifically designed to provide understory forage recovery, away from streams and riparian vegetation, and to improve small parks and openings through meadow maintenance and thinning near these sites (USDA 2007).

The analysis area is within State Game Management Unit (GMU) 44 and 49. GMU 44 has shown population fluctuations of 1,421 elk in 2001 to 2,541 elk in 2005 using sightability surveys. GMU 49 has shown minimal population fluctuations of 405 in 2001 and 487 in 2002. The population of elk on the Carson National Forest is up from 1986 and is considered currently stable (USDA 2007). Future implementation of prescribed burning, urban-interface fire projects, thinning, aspen regeneration, meadow maintenance, road closures, and intensive livestock grazing management should improve elk foraging habitat. Subsequently, these forest activities will maintain elk populations (USDA 2007).

Alternative A

Implementation of alternative A would not change forest-wide habitat or population trends and would benefit elk for the long term. It is anticipated there would be an increased density of vegetation species, such as shrubs, forbs, and grasses. Over time this alternative would increase forage for elk and improve year-round habitat. Due to the reduced human disturbance from permittees no longer managing their livestock on the allotment, elk may be more attracted to the area.

Alternative B

Under this alternative, short-term positive benefits to habitat used by elk would occur in the form of increased herbaceous vegetation. The terms and conditions of the grazing permit and implementation of annual operating instructions for allotment management would provide flexibility in livestock numbers, entry date, and period of use and would assist in continuing to meet the desired condition which would benefit the foraging conditions for elk. Most studies of fire and wildlife foods in western forests focus on ungulates. This research generally indicates burning produces positive results for elk and mule deer.

During the first 5 to 10 years following stand-replacing fire, grass and forb biomass generally increases. Grass and forb biomass decreased the first growing season after fire in aspen stands in Wyoming, but increased the second and third growing seasons to above preburn levels (Bartos and Mueggler 1981). Forage increased three-fold after both understory and stand-replacement fire in a ponderosa pine forest in Arizona (Oswald and Covington 1983). Based on the above information, this alternative would benefit local populations within the vicinity of this allotment and would benefit habitat trends for elk across the forest. Population trends across the forest would remain stable.

Abert's Squirrel

Abert's squirrel is an indicator species for interlocking canopies in ponderosa pine. Abert's squirrel habitat has increased from 53,220 acres in 1986 to 63,794 acres in 2005, for an increase of about 20 percent forest-wide (USDA 2007). The MIS Assessment for the Carson National

Forest (USDA 2007) states the population trend for Abert's squirrel is considered to be on a downward trend and not stable at this time. Populations on the forest are anticipated to rebound after the drought cycle ends and ponderosa pine trees start producing a more reliable seed crop once again. There are approximately 23 acres of ponderosa pine habitat on the Angostura Allotment. It is not known how much of the 23 acres would constitute suitable habitat. Based on observations by district personnel Abert's squirrel are present on the allotment.

Tree density, diameter, and grouped distribution of trees are the most important components of Abert's squirrel nest cover. The right combinations of these factors provide squirrels with optimum conditions necessary for nest protection. The best cover conditions are found in uneven-aged ponderosa pine stands with trees spaced in small, even-aged groups within the stand. These pine stands have densities between 200 and 250 trees per acre. Average tree diameter for the stand is between 11 and 13 inches in diameter at breast height (DBH), but the presence of small groups of larger trees produces a mosaic of height groups (Patton 1975a). Pine twigs, pine cones, pine seeds, pine bark, as well as truffles (underground mushrooms known to form mycorrhizal associations with ponderosa pine) are used by the Abert's squirrel (Farentinos et al. 1981, States 1988). Management activities such as prescribed burning would continue to reduce fuels and competition and enhance the quality of the squirrel's habitat.

Alternatives A and B

Under alternative A, forest-wide population and habitat trends would continue with no livestock grazing. Under alternative B, livestock grazing would not have an effect on Abert's squirrel habitat. A light to moderate understory burn would benefit forage for the squirrel, by stimulating nutrient cycling, promoting grasses and forbs. Under alternatives A and B, forest-wide population and habitat trends for Abert's squirrel would not change.

Hairy Woodpecker

Hairy woodpecker is an indicator species for snags. On the Carson National Forest, this species is commonly observed throughout the ponderosa pine and mixed conifer habitat types. Snags comprise an important habitat component for many woodpeckers and other cavity-nesting species. Low snag availability resulting from timber harvest, fuelwood removal, or intense surface fires may adversely affect populations of snag-dependent species, such as the hairy woodpecker (Balda 1975 and Thomas et al. 1979). Natural occurrences, such as wildfire and lightning strikes, can also create favorable habitat conditions for the hairy woodpecker. Woodpeckers generally nest in snags or in the forest canopy. Reports indicate that populations of woodpeckers using forests with understory fire regimes tend to be unaffected by underburns (USDA 2000). Several studies show that woodpeckers are particularly attracted to burned areas (USDA 2000). On the Carson National Forest, hairy woodpecker habitat has increased from 106,880 acres in 1986 to 112,444 acres in 2005, for an increase of five percent forest-wide. Population trends of hairy woodpecker are stable on the Carson National Forest using the best available information (USDA 2007).

Alternatives A and B

Since livestock grazing would not affect hairy woodpecker habitat, there would be no difference in impacts related to grazing between alternatives. Prescribed burning under alternative B would be used to enhance the quality of hairy woodpecker habitat. As long as snags and large trees are

protected, burning would generate more understory grasses and forbs, which in turn would support more insects for a forage base. This management practice would also promote larger trees more quickly, providing better cavity opportunities for nesting. Implementation of alternative A or B would not change forest-wide habitat and population trends.

Red Squirrel

The red squirrel is an indicator species for the presence of mixed conifer. Red squirrel habitat has increased from 169,400 acres in 1986 to 204,873 acres in 2005, for an increase of about 20 percent forest-wide (USDA 2007). Red squirrels utilize large diameter trees for nesting. Food caches (middens) are of paramount importance to red squirrels (Reynolds et al. 1992, Findley et al. 1975, Larson and Boutin 1994). A large centrally located midden is the most prominent feature of red squirrel territories. It is located in moist, shaded areas. At cache sites, groups of mature trees and shading from additional understory and overstory vegetation maintain the humidity necessary to prevent the cones from opening (Vahle 1978). The maintenance of many mature coniferous forest types is often dependent on fire. Ponderosa pine, Douglas-fir, lodgepole pine, whitebark pine, and spruces are either dependent on stand replacing fires for regeneration or on low-severity fires for maintenance. Even though severe fire is immediately destructive of red squirrel habitat, the long-term maintenance of most coniferous forests is dependent on fire (USDA 2002a). Using the best available science, the forest-wide MIS Assessment (USDA 2007) considers the red squirrel population trend to be stable. There are approximately 5,054 acres of mixed conifer on the Angostura Allotment. Based on observations of district personnel red squirrels are present on the allotment.

Alternatives A and B

Since livestock grazing would not affect red squirrel habitat, there would be no difference in impacts related to grazing between alternatives. Prescribed burning under alternative B would control dense conifer reproduction and would improve the habitat for the red squirrel. Prior to burning, efforts should be made to locate squirrel caches and protect them during prescribed fire operations. Implementation of alternative A or B would not change forest-wide habitat and population trends for red squirrel.

Wild Turkey

Wild turkey is an indicator species for old growth pine. There are three essential habitat components. These include surface water, roosting trees, and openings for summer brood areas (Kamees 2002). Turkey habitat has increased on the Carson National Forest from 117,300 acres in 1986 to 118,816 acres in 2005, for an increase of about 1% (USDA 2007). Using the best available science, the forest-wide MIS Assessment (USDA 2007) considers the turkey population to be in stable to upward trend. There are currently 23 acres of ponderosa pine habitat on the Angostura Allotment. It is not known how much is classified as old growth pine. Based on observations of district personnel turkey are present on the allotment.

Alternatives A and B

Since livestock grazing would not affect turkey habitat, there would be no difference in impacts related to grazing between alternatives. Prescribed fire has been identified as a positive management tool to enhance turkey habitat, especially for broods, by opening up understory

vegetation through the removal of thick shrub growth and stimulating grass, forb, and legume production (Kamees 2002). Implementation of alternative A or B would not change forest-wide habitat and population trends for wild turkey.

Migratory Birds

On January 10, 2001 President Clinton issued Executive Order 13186 “Responsibilities of Federal Agencies to Protect Migratory Birds” directing Federal agencies to comply with the Migratory Bird Treaty Act (MBTA). To meet the intent of Executive Order 13186, we analyzed the effects to migratory birds that are on both the U. S. Fish and Wildlife Service’s “Birds of Conservation Concern” report for the Southern Rockies/Colorado Plateau Bird Conservation Region #16 (2002), and the Carson National Forest Migratory Bird Assessment (CMBA) dated July 27, 2001. For species only found in the CMBA, only the effects to species that qualified as highest priority were analyzed. [62]

The following list describes habitats found on the Angostura grazing allotment and the migratory birds that are typically found in these habitats. Surveys have been conducted forest-wide and some of the species listed below have been found to occur on the forest. No surveys have been conducted specifically within this allotment for this project to determine presence but have the potential of occurring within these habitats.

Table 20. Migratory birds that may occur within Angostura Allotment and likely effects of alternative B

Migratory Bird	Habitat	Effects
Grace’s Warbler (<i>Dendroica graciae</i>)	<ul style="list-style-type: none"> • Occupies ponderosa pine forests, sometimes with a scrub oak component, but preference given to mature and old growth forest. • Feeds in upper portions of robust pines on branches, nests found from 6-18 m (20-60 ft) above the ground in trees. 	Grazing or prescribed (Rx) burning would not affect habitat.
Lewis’s Woodpecker (<i>Melanerpes lewis</i>)	<ul style="list-style-type: none"> • Large open canopy, snags, and dead and downed wood. • Open cottonwood-dominated riparian woodland, but also open ponderosa pine and burned pine forest. Pine forests may be preferred at higher elevations; cottonwood forests are preferred at lower elevations. May move in several years after a fire. • Nests in large, dead or decaying trees. Nest trees are larger and taller than random sample. 	Grazing would not affect habitat. Rx burning would be beneficial to this species by keeping habitat open.
Virginia’s Warbler (<i>Vermivora virginiae</i>)	<ul style="list-style-type: none"> • Occurs mostly in ponderosa pine forests. • Requires open forests with well-developed herbaceous or dense woody understory. • Nests on the ground, in a depression or at base of a shrub, concealed by dead leaves or overhanging foliage or grasses, especially in Gambel oak. 	Grazing would not affect habitat. Rx burn would remove understory, could burn any nests within project area.
Red-naped sapsucker (<i>Sphyrapicus</i>)	<ul style="list-style-type: none"> • Inhabits deciduous forests, desert riparian woodlands, marsh, and cottonwood stands. 	Grazing or Rx burning would not affect habitat.

Migratory Bird	Habitat	Effects
<i>nuchalis</i>)	<ul style="list-style-type: none"> • Nests in snags. 	
Hammond's flycatcher (<i>Empidonax hammondi</i>)	<ul style="list-style-type: none"> • Inhabits spruce-fir, ponderosa pine, and riparian woodlands. • Nests often built in large conifers • Mainly aerial forager • Associated with forests bordering willow-alder streams, medium to high canopy cover, cool shaded sites, open conifer forests, and edges of clearings. 	Grazing or Rx burning would not affect habitat.
American dipper (<i>Cinclus mexicanus</i>)	<ul style="list-style-type: none"> • Found along and in fast flowing, pristine mountain streams. • Aquatic insects compose majority of diet • Structures such as rock outcrops, cliff/ledges and logs are necessary for nest concealment. 	Grazing or Rx burning would not affect habitat. No Rx burning in riparian zone.
Veery (<i>Catharus fuscescens</i>)	<ul style="list-style-type: none"> • Inhabits dense, moist woodlands, and riparian thickets of alder and willow. • Forages mostly on ground for insects and fruit • Nests on or near ground • Currently known only along Penasco area streams 	Usually responds negatively to grazing. There is a potential for trampling of nests, crushing eggs and killing young. No Rx burning in riparian zones.
MacGillivray's warbler (<i>Oporornis philadelphia</i>)	<ul style="list-style-type: none"> • Inhabits shrubby habitats in spruce-fir, mixed conifer, and riparian shrublands. • Requires low, dense, moist shrub understory for breeding. • Associated with cut-overs, burns, new growth in slash, shrubbery of mountain valleys, forest edge, dense willow, and meadow edges. 	Usually responds negatively to grazing as grazing may affect nest height. Use Rx burning to create successional stage shrub development.
Wilson's Phalarope (<i>Phalaropus tricolor</i>)	<ul style="list-style-type: none"> • Occurs in wet grasslands, salt playas, flooded fields and marshes. • Nests in taller, denser, more heterogeneous vegetation than surrounding areas. • Nests on the ground 	Trampling of nest could occur resulting in the crushing of eggs and killing young. No Rx burning in wet meadows.
Bobolink (<i>Dolichonyx oryzivorus</i>)	<ul style="list-style-type: none"> • Utilizes grass-sedge meadows, hay field, irrigated fields and riparian bottomlands; nesting areas have higher vertical density than surrounding areas. • Utilizes wet meadows for breeding • Utilizes hay fields older than 8 year and greater than 74 acres 	Light to moderate grazing has a beneficial effect on habitat. No Rx burning in wet meadows
White-tailed Ptarmigan (<i>Lagopus luecurus</i>)	See Forest Service sensitive species section	
Brown Capped Rosy-Finch	Uses cirque headwalls, talus slopes and permanent or	Grazing or Rx burning would not

Migratory Bird	Habitat	Effects
<i>(Leucosticte australis)</i>	late-melting snowfields. Nests on cliffs or on the ground, both with an overhanging rock for concealment. Nests often placed near snowfields and situated so that sunlight does not hit the nest.	affect habitat
Boreal Owl <i>(Aegolius funereus)</i>	See Forest Service sensitive species section	
Blue Grouse <i>(Dendragapus obscurus)</i>	Nests in virtually all montane forest communities with relatively open tree canopies out of 1.2+ mi (2+ km) from forest edge; prefer forests dominated by ponderosa pine or Douglas fir. Nests almost always on ground with some overhead cover, usually under shrubs, rock overhangs, logs or stumps. They may nest at base of large trees with no immediate cover in older mature forest. Nest site may change from barren at time of laying, to lush and well-concealed at hatch. Nests within 50-150 m of water Suggestion of a positive correlation between density of birds and age of dominant trees up to about 10 yrs post-logging and a negative correlation after that. Density of birds decreases as tree canopy increases.	Grazing and Rx burning may have a negative effect on habitat. Trampling of nest could occur, resulting in crushing of eggs and killing young. Could have a negative effect on local population if several nests get trampled during a season. Rx burning may temporarily displace individuals.
Northern Goshawk <i>(Accipiter gentiles)</i>	See Forest Service sensitive species section	
Mexican Spotted Owl <i>(Strix occidentalis lucida)</i>	See federally listed species section	
Williamson's Sapsucker <i>(Sphyrapicus thyroideus)</i>	<ul style="list-style-type: none"> • Mid to high elevation coniferous forests and mixed deciduous/conifer forests. Aspen is an important nesting substrate. • Wounded or scarred live conifers most frequently used for feeding. • Availability of suitable nesting sites critical component, preferring snags or cavities in live aspen. Nests in conifers infected with the fungus (<i>Fomes igniarius</i>), or aspens with heart rot. Drainage bottoms preferred over ridge tops. In NM, nests have been found in ponderosa pine and spruce. 	Grazing would not affect habitat. Rx burning may temporarily displace individuals.
Olive-sided flycatcher <i>(Contopus cooperi)</i>	<ul style="list-style-type: none"> • Nests in coniferous trees generally far out from trunk. • Needs forest edges for foraging and increases in density with a decrease in canopy cover. • Needs snags or tree tops near open areas or above canopy as diet consists mainly of larger flying insects, primarily bees. 	Grazing would not affect habitat. Rx burning may temporarily displace individuals
Dusky flycatcher <i>(Empidonax)</i>	<ul style="list-style-type: none"> • Uses mixed conifer and ponderosa pine forests with a shrubby understory. 	Grazing would not affect habitat. Rx

Migratory Bird	Habitat	Effects
<i>oberholseri</i>)	<ul style="list-style-type: none"> • Shrub component appears to be critical in New Mexico. • Openings near shrubs needed for foraging. • Nest height avg 6.5 ft above ground; tends to correspond to shrub height • Uses early succession habitat following a • Disturbance, such as fire 	burning may temporarily displace individuals.

Cumulative Effects on Wildlife

The past, present and reasonably foreseeable activities (table 21) include wildfires, prescribed burning, timber harvesting, livestock grazing, recreation, and small wood product removal in or adjacent to the Angostura Allotment. These projects have cumulatively contributed to the current condition of the area.

Table 21. Past, present and reasonably foreseeable activities in the Rio Pueblo Watershed considered in cumulative effects for wildlife

Activity	Time Period
Duran Timber Sale – 23 ac	1985
Picacho Timber Sale – 488 ac	1985
East Raton Timber Sale - 5 ac	1986
West Raton Timber Sale - 7 ac	1985
Drop Out Timber Sale - 275 ac	1986
Alamitos Timber Sale – 523 ac	1988
Historical livestock grazing on the analysis areas	Historical
Wildlife use, such as elk	Ongoing
Existing and anticipated road use from recreationists, wood gatherers, fire patrol, hunters	Ongoing
Past, present, and future road maintenance of transportation system	Ongoing
Fish barrier installation on Alamitos Creek	Future

Past activities and future activities have and will reduce fuel loading in the area. However, there is still a chance that the area could experience a stand-replacing wildfire. A stand-replacing wildfire would incrementally result in the loss of nesting habitat for MSO, northern goshawk, and high priority migratory bird species on or adjacent to the allotment. Depending on the severity and size of the wildfire there could be some benefits to elk and other wildlife by providing foraging habitat for them. The proposed prescribed burns would enhance understory bird habitat by increasing shrubs and grasses. The areas currently open to off-road vehicle travel will be closed to off-road motorized vehicle travel (Travel Management Rule) within the next year, this would generally be beneficial due to less motorized disturbance across the allotment.

Summary

The implementation of alternative A would not significantly impact or impair wildlife resources or values that are necessary to fulfill the specific purposes identified in the “Purpose and Need” for the Angostura Allotment grazing analysis. Management activities associated with livestock grazing and prescribed burning (alternative B) may affect wildlife species by affecting prey base habitat, cover, and nesting habitat.

Aquatic Species

This section addresses aquatic wildlife, including Forest Service sensitive species and forest management indicator species. There are eight fish species on the Regional Forester’s sensitive species list (September 21, 2007) that potentially occur on the Camino Real Ranger District, Carson National Forest (Keckler 2008a). Table 22 provides a list of these sensitive species. If species do not have habitat in the analysis area or habitat is present, but not affected, they are excluded from further analysis in this document. [64]

Table 22 Forest Service sensitive aquatic species for the Carson National Forest

Forest Sensitive Species	Habitat Present	Habitat Not Present or Doesn't Occur in Area	Habitat Present, Not Affected	Comments
Rio Grande chub (<i>Gila pandora</i>)		X		Does not occur in Rio Pueblo drainage; Analysis not needed.
Rio Grande cutthroat trout (RGct) (<i>Oncorhynchus clarki virginalis</i>)	X			Habitat present on Rio Pueblo and its perennial tributaries. RGct are only found in Rito Angostura and Alamos creek; Analysis needed.
Rio Grande sucker (<i>Catostomus Plebeius</i>)		X		Does not occur in Rio Pueblo drainage; Analysis not needed.
Bluehead sucker (<i>Catostomus discobolus discobolus</i>)		X		Occurs in the San Juan drainage. Analysis not needed.
Flannelmouth sucker (<i>Catostomus latipinnis</i>)		X		Occurs in the San Juan drainage. Analysis not needed.
Roundtail chub (<i>Gila robusta</i>)		X		Occurs in the San Juan drainage. Analysis not needed.
Speckled dace (<i>Rhinichthys osculus</i>)		X		Occurs in the San Juan drainage. Analysis not needed.

Rio Grande Cutthroat Trout

Rio Grande cutthroat trout (*Oncorhynchus clarki*) was listed under the Natural Heritage Global Rank "G2" ("G2" = "Imperiled") (BISON-M 2008) and is currently listed as “Proposed” by the

U.S. Fish and Wildlife Service (USFWS 2008). The greatest apparent threat to the Rio Grande cutthroat trout has been the introduction of nonnative salmonids, primarily rainbow, brook, and brown trout. Rainbow trout readily hybridize with cutthroat trout and the other two species compete with the Rio Grande cutthroat trout for food and space. Predation by introduced salmonids may also be a factor worth considering in the management of this native subspecies (Pritchard 2006).

Cutthroat trout habitat is found in clear, cold, perennial streams, with consistent water flow. Stream bottom substrate needs to consist of gravel with low sedimentation to allow for aquatic insect reproduction. Overhanging streambank vegetation and large woody debris provide deep pools for overwintering trout survival and for maintaining cool water temperatures. Livestock grazing along the creek could cause streambank trampling and forage removal; thereby adding sedimentation and removing overhanging vegetation.

Rito Angostura and Alamitos Creek (Dropout, Upper Alamitos, Lower Alamitos, Agua Sarca-Loring Spring pastures) are found to contain pure populations of Rio Grande cutthroat trout. Within the Angostura Allotment, a three pass regression population survey was conducted in the Rito Angostura in 2003 and Alamitos Creek in 2004, 2005, 2006, and 2007 (NMDGF 2003-2007). These surveys can be used to estimate population throughout the stream courses. Currently there is a population of Rio Grande cutthroat trout present within the Rito Angostura, with an estimated population of 2,180 fish per hectare, all of which were Rio Grande cutthroat trout. Alamitos Creek has an estimated trout population of 965 fish per hectare, all of which were Rio Grande cutthroat trout. The population has been showing an increase since the 2003 monitoring (NMDGF2008). A waterfall along Rito Angostura and the diversion for Sierra Ditch (to Holman) function as fish barriers for part of the year, preventing nonnative salmonids from moving up into Rio Grande cutthroat trout habitat. There is a window in the spring at which point fish can navigate past the structure.

Recent macroinvertebrate data from lower Rito Angostura (see water quality section) suggests livestock grazing management is compatible with achieving the biological water quality criteria in Rito Angostura. Instantaneous grab samples for pH, specific conductance, and temperature in 1988, 1989, and 1991, and turbidity in 1995 meet current water quality criteria. Due to active headcuts and some streambank instability, sedimentation occurs along portions of Rito Angostura, Alamitos Creek, and their tributaries, as they continue to adjust to historic logging, past grazing practices, and altered flow regimes from diversions. The current condition of Rito Angostura, Alamitos Creek, and their riparian areas is good, with stable populations of cutthroat trout and aquatic insects.

Alternatives A and B

Effects of alternatives A and B to Rito Angostura and Alamitos Creek would be similar over the long term. The difference between alternatives would be the expected rate of change, with alternative A generally achieving riparian management objectives in a shorter time frame than alternative B, but measurable progress would be made within the life of the grazing permit.

Without livestock grazing, there would be no loss in Rio Grande cutthroat trout populations or their habitat. Livestock grazing in alternative B would continue in areas along Rito Angostura and Alamitos Creek, but riparian habitat would maintain proper function as a filter for sediment. In turn, good water quality to support Rio Grande cutthroat trout populations would be maintained.

Steepness of the hillslope and connectivity of the road system have a strong influence on movement of soil and nutrients into stream channels where they can affect water quality. Prior to prescribed burning, a buffer area would be delineated along any stream channels to exclude burning in riparian vegetation. This mitigation measure would minimize removal of ground cover near stream channels and reduce the risk of surface erosion and sedimentation into them.

Any temporary loss of groundcover from prescribed burning in alternative B would be compensated by increased vegetation ground cover following shortly after burning, during the next spring green-up, or following the next rainfall. Since riparian vegetation would be buffered from burning, ash or sediment delivery to channels would not be expected.

The magnitude of the effects of fire on water quality and Rio Grande cutthroat trout habitat is primarily driven by fire severity, and not necessarily by fire intensity. The more severe the fire, the greater the amount of fuel consumed and nutrients released, and the more susceptible the site is to erosion of soil and nutrients into the stream where they could potentially affect water quality. Use of prescribed fire allows the manager the opportunity to control the severity of the fire and to avoid creating large areas burned at high severity. Under alternative B, grazing and prescribed burning may have short term impacts to Rio Grande cutthroat trout habitat and individuals, but no impact to overall populations.

Resident Trout and Aquatic Macroinvertebrates

Resident trout and aquatic macroinvertebrates (aquatic insects) are indicator species for perennial stream and riparian habitat on the Carson National Forest (USDA 1986). Like cutthroat trout, trout and aquatic insect habitat is clear, cold, perennial streams with consistent water flow. Stream bottom substrate needs to consist of gravel with low sedimentation to allow for aquatic insect reproduction. Livestock grazing along the creek could cause streambank trampling and forage removal; therefore adding sedimentation and removing overhanging vegetation.

Aquatic macroinvertebrates are found in Rito Angostura and Alamitos Creek, within Dropout, Upper Alamitos, Lower Alamitos, Agua Sarca-Loring Spring pastures. Macroinvertebrate data was collected and analyzed using the Hilsenhoff biotic index (HBI) and taxa richness. The HBI summarizes the overall pollution tolerances of the taxa collected. The HBI is best at detecting organic pollution and has been used to detect nutrient enrichment, high sediment loads, low dissolved oxygen and thermal impacts. The HBI is influenced by the presence of filter feeders (feed on suspended fine organic matter), which are generally more abundant in systems that contain lakes and beaver ponds (Vinson 2008). Vinson (2008) indicated taxa richness is probably a better metric to describe the overall health of these systems. Richness is a component and estimate of community structure and stream health and is based on the number of distinct taxa. Richness normally decreases with decreasing water quality; however, in some cases, organic enrichment can cause an increase in the number of pollution tolerant taxa. Table 23 is a summary of samples collected in the Rito Angostura and indicate good stream health.

Table 23. Hilsenhoff biotic index (HBI) summary for aquatic macroinvertebrates in Rito Angostura

Site ID	Pollution Intolerant		Pollution Tolerant	
	Richness	% of Total	Richness	% of Total

Site ID	Pollution Intolerant		Pollution Tolerant	
	Richness	% of Total	Richness	% of Total
ANGOST01	11	37	1	3
ANGOST02	08	36	1	5

Field observations in 2007 estimate overall macroinvertebrate habitat quality to be good and improving. Within the allotment, streambank conditions of Rito Angostura and Alamos Creek are properly functioning, with small localized areas of impact. The current channel morphology is probably not a result of current management within the upper watershed. Rather, the stream is most likely still responding to past disturbances and will likely experience future adjustments in response to high runoff events.

Alternatives A and B

As discussed under Rio Grande cutthroat trout, the effects of alternatives A and B to Rito Angostura and Alamos Creek would be similar over the long term. The difference between alternatives would be the expected rate of change, with alternative A generally achieving riparian management objectives in a shorter time frame than alternative B, but measurable progress would be made within the life of the grazing permit.

Without livestock grazing, there would be no loss in aquatic macroinvertebrate populations or their habitat. Livestock grazing in alternative B would continue in areas along Rito Angostura and Alamos Creek, but riparian habitat would maintain proper function as a filter for sediment. In turn, good water quality to support macroinvertebrate populations would be maintained. Under alternative B, grazing and prescribed burning may have short-term impacts to localized aquatic macroinvertebrate habitat and individuals, but would not impact diversity or change habitat or population trends on the Carson National Forest.

Effects on resident trout from alternatives A and B are considered to be the same as discussed in the previous section for Rio Grande cutthroat trout, since surveys in Rito Angostura and Alamos Creek found only Rio Grande cutthroat trout. Management of livestock grazing under alternative B and prescribed burning on the Angostura Allotment would not change the resident trout habitat or population trends on the Carson National Forest.

Cumulative Effects on Aquatic Species

The cumulative effects of past and present activities (table 4) such as past railroad logging, existing roads and trails, and water developments and acequias, are reflected in the previous discussion on aquatic species. The proposal to prohibit cross-country travel by motorized vehicles (travel management), along with the effects of alternative B, would result in less damage to riparian areas, wetlands, seeps and springs from motorized use and would have an overall beneficial effect on the watershed and water quality. In addition, a proposal to install or reconstruct a barrier along Alamos Creek to ensure nonnative trout species do not move up into native Rio Grande cutthroat habitat is being considered by the Camino Real Ranger District. The exact location of the proposed barrier has not yet been determined. NEPA analysis of this proposal is needed and implementation may occur in the next 2 years. This would completely protect approximately 7 miles of stream from exotic trout infestation. The proposed Alamos

Creek fish barrier would ensure the viability of current Rio Grande cutthroat populations by preventing nonnative salmonids from moving upstream into Rio Grande cutthroat trout habitat. There are currently no invasive plants mapped on the Angostura Allotment, therefore there are no known effects from invasive species or future treatment on aquatic species. Burning proposed under alternative B, with mitigation measures to protect riparian vegetation, would also reduce the threat of catastrophic wildfire, which could result in the loss of the total populations of Rio Grande cutthroat trout within the Rito Angostura and Alamitos Creek.

Drought conditions and subsequent climate warming could alter the habitat for Rio Grande cutthroat trout in Rito Angostura and Alamitos Creek. Except for the past two years, northern New Mexico has been experiencing drought conditions since 1996. The worst conditions were in 2002, when precipitation was at its lowest. During drought years, including 2002, water sources (mainly seeps and springs) used by livestock on Angostura Allotment never dried up. This can primarily be attributed to the allotment's high elevation. If water sources were to dry up and livestock had to rely more on Rito Angostura and Alamitos Creek, adjustments to grazing management would protect riparian areas and Rio Grande cutthroat habitat. Livestock numbers and season of use would be much less and more intensive management along these stream courses would be required; therefore it is not likely livestock grazing under drought conditions would put the viability of Rio Grande cutthroat trout populations in Rito Angostura and Alamitos Creek at risk.

Cultural Resources

The Angostura Allotment falls within portions of the Santa Barbara Land Grant and the Mora Land Grant. The area has a long history of human use prior to the advent of the Carson National Forest. The allotment was used by Spanish settlers, the Picuris Pueblo, and several other tribal groups. The allotment was used by both groups as a natural resource gathering and hunting area. By the mid-1700's Spanish had begun settling the Peñasco Valley. The Santa Barbara Land Grant was awarded to a group of Spanish settlers in 1796. The settlers founded the towns of Llano Largo, Llano San Juan and Santa Barbara. During the early 1800's families from Santa Barbara, Chamisal, and Las Trampas began settling the Mora Valley. Needing water to irrigate their crops, they constructed the Acequia La Sierra. According to Arellano (1985) the acequia, which originates near the headwaters of La Jicarita Peak (within the Angostura Allotment) was constructed by the early 1930's. It is likely the Spanish used the area more intensively because of their close proximity to the allotment area. They would have relied on the forested areas for timber for vigas and large amounts of firewood for heating and cooking. They would also have used the area as alternate grazing areas for their sheep and later cattle. The Picuris and the Spanish from the Mora valley relied on the Rio Pueblo as the source for their acequia systems. By the early 1900's a new resource use led to many years of detrimental ecological impacts. The Santa Barbara Tie and Pole Company acquired a large portion of the Santa Barbara Land Grant; ultimately, harvesting about 400,000 railroad ties annually for 17 years. These lands were acquired by the federal government in the 1930's and became part of the National Forest System.

There have been twenty-eight heritage resources surveys conducted within the 17, 716 acre Angostura Allotment. A total of 1,859 acres or 10.5% of the entire allotment has been examined for heritage resources. The Carson National Forest Heritage Resources atlas maps and the New Mexico Cultural Resources Information System (NMCRIIS) computer files were consulted, and twenty heritage resources sites have been recorded within the allotment. One site is located within

a key grazing area. This site is considered “sensitive” per the Region 3 programmatic agreement. This site, plus another one which was possibly being impacted by grazing, was monitored during a field visit to determine the extent of the impacts from grazing. The site visit showed the attributes which make both sites eligible to the National Register of Historic Places were not being impacted by grazing. Therefore, no mitigation measures are needed to protect the sites. [56]

In addition to field surveys, the site atlas, literature, GLO maps, Taos County mining records, mineral surveys, and survey plats were reviewed. The district archaeologist had personal communication with range and other resource specialists who visited the allotment. An archaeological clearance and inventory standards and accounting (IS&A) report has been completed for the proposed action based on a no adverse effect to cultural resources determination. The Southwestern Region First Amended Programmatic Agreement Regarding Historic Property Protection and Responsibilities (Grazing Protocol) (USDA 2003) was followed. Any future ground-disturbing improvements on the allotment not covered in this EA or previous archaeological clearance would be subject to separate Section 106 consultation prior to implementation.

Alternatives A and B

Retaining or reducing current usage would have no adverse effect on heritage resources. Both alternatives would either retain or reduce livestock numbers within the Angostura Allotment. Alternative B would also include ground disturbing activities designed to improve the livestock distribution within the allotment. Under alternative A with no permitted livestock grazing on the allotment, no effect to sensitive or non-sensitive cultural sites would occur. Alternative B would have the possibility of livestock trampling on sensitive and non-sensitive cultural sites, which may make individual sites vulnerable to erosion. Field observations show effects of cattle trampling would not impact the sites further than they have already been disturbed from past historic and prehistoric activities and would not result in adverse effects to any sites. Alternative B would also include ground disturbing activities designed to improve the riparian conditions around Loring and Agua Sarca Springs. These improvements would take place within the next two years. No heritage resources were located during the surveys for improvements at Loring and Agua Sarca Springs; therefore, these two proposals would have no effect on heritage resources.

Cumulative Effects on Cultural Resources

The cumulative effects of past and present activities (table 4) such as acequias and past railroad logging are reflected in the previous discussion on sensitive and non-sensitive sites. Under either alternative proposed closure of off-road vehicle travel would result in less access to sites and would have a beneficial cumulative effect on sites, in combination with grazing. There would be no other cumulative effects on cultural resources. Current legal requirements would be followed requiring section 106 consultation before improvements not covered in this document would be implemented. Consultation is done following an on-the-ground survey for cultural resources. Normally located cultural resources are avoided. The known sites are avoided or have been visited to ascertain impacts. Cattle trampling would not impact known sites further.

Recreation

A four-season spectrum of recreation opportunities is available in the analysis area including but not limited to camping, picnicking, hiking, mountain biking, equestrian use, ATV and dirt-bike

riding, fishing, hunting, sightseeing, cross-country skiing, snow-shoeing, and snowmobiling. Each year, approximately 400 individual elk and 200 individual deer hunting licenses are issued for unit 49, the area immediately surrounding and including the Angostura analysis area. The designated recreation infrastructure located within the analysis area includes the following designated non-motorized trails: Agua Sarco Trail #16 – 2.8 miles; Serpent Lake Trail #19 – 4.0 miles; and Angostura Trail #493 – 2.1 miles. It also includes the following designated motorized trail: Angostura & Cut-off Trail #493 and #9A – 2.7 miles. [48]

The analysis area is categorized as Semi-Primitive Motorized (SPM) Semi –Primitive non-motorized (SPN) and Primitive (P) under the Recreation Opportunity Spectrum (ROS). None of the alternatives being considered would affect the ROS categorization of the area.

Alternatives A and B

Alternative A could have a positive effect on recreation activities. Ceasing all grazing would effectively eliminate conflicts between livestock and people by eliminating the smell and sight of manure, the attraction of flies, and the sight of livestock in a forest setting.

Livestock grazing proposed in alternative B could have negative effects on some recreation activities. The smell and the appearance of the manure, along with the attraction of flies around dispersed campsites and trails, can be contrary to the experience many forest visitors seek when visiting the area. Additionally, the sight of livestock in the forest, whether it is in a dispersed camping area or along a trail, can also be disappointing to some forest visitors who do not approve of grazing or do not understand the multiple-use management ideology.

Under alternative B, there is an area of concern regarding the continuing use of ATV's by grazing permittees to move and monitor livestock in the various pastures. This can be authorized through their term permit, within the primitive motorized portions of the allotment. Permittee use of ATV's off designated trails/roads could create illegal non-system trails. These trails, once established by the permittee, are then frequented by unaware/uninformed recreationists who continue this illegal use.

The proposed prescribe burning in the allotment could have short-term negative effects on recreationists. The displacement of recreational activities to other parts of the forest during the prescribed burning would be the most immediate effect. Following the prescribed fire, the “blackened” forest would be visually displeasing and possibly frightening to some visitors and could reduce the quality of the recreation experience. This condition would be temporary.

Cumulative Effects on Recreation

There would be no cumulative effect on recreational activities through selection of either alternative. Recreational activities are not precluded by not grazing or grazing the allotment. The majority of the allotment is not grazable by domestic livestock. The grazed or recently grazed areas are readily avoidable by recreationists. The effects on recreational activities are temporary and not cumulative. The livestock are removed, the manure degrades, and the flies die off every year.

Wilderness

Approximately 2,083 acres, or 12%, of the Angostura Allotment are located within the Pecos Wilderness Area. The management emphasis in the Pecos Wilderness is to preserve wilderness character and values. It is managed to retain the “primeval wild character and influence, without permanent improvements or habitation and...protected...to preserve the natural conditions.” Primitive recreation opportunities, wildlife habitat management, grazing, and fire management occur only when consistent with these values and where historically established. Livestock grazing was an established activity in this area prior to the designation of the Pecos Wilderness in 1964. The visual quality objective is to preserve the natural landscape absent of man-made developments. Under both alternatives no fence or water developments would occur within the wilderness area, therefore the wilderness characteristics would be retained and there would be no indirect, direct, or cumulative effects. [48]

Wild and Scenic Rivers

In 1968, Congress enacted the National Wild and Scenic Rivers Act, establishing a system for preserving outstanding free-flowing rivers. The analysis performed for the Angostura Allotment project addresses step one, the “determination of eligibility”. There are four waterways in and adjacent to the analysis area: the upper Rio Pueblo, the Rito Angostura, the Knob Creek, and the Rito Alamitos. In 1996, the Camino Real Ranger District analyzed them against the criteria for Wild and Scenic Rivers. Based on these criteria, three of these waterways were determined not eligible. The fourth, the Rito Alamitos, supports a pure Rio Grande cutthroat fishery and is therefore eligible for its outstanding “fish” value. [48]

Alternatives A and B

Alternative A would ensure that the eligibility value of fisheries would be maintained along the Rito Alamitos. The level of grazing proposed in alternative B would not degrade or diminish the eligibility value of fisheries along the Rito Alamitos, thus maintaining its eligibility status.

Cumulative effects

Taking account the effects of other past, present and reasonably foreseeable activities the eligibility status of the streams within the analysis area would be maintained. There is no cumulative effect.

Economics

For the past eight years the permittees have been stocking the allotment with 65-89 head of cattle for 4 months. This would generate an estimated \$11,726-\$16,055 gross annual income from the time livestock would spend on the allotment. This is a general and generous estimate of income, but not profit, and doesn't include the various expenses that normal livestock operations require, such as veterinarian fees, winter feeding, and equipment maintenance (trucks and trailers) etc., which can be extremely variable between operations. It gives a general idea of income being generated from the livestock operation on the allotment and is a basis for comparison of alternatives. A cow/calf income spreadsheet was used to estimate the total gross income that an operator could attribute to their livestock operation on NFS land (grazing allotment). The number of cows to be stocked was multiplied by the percent calf crop to estimate how many calves are

born. The assumption was made that half of the calves are female (heifers) and half are males (steers), which are either going to be sold or kept as “replacement heifers”. When cows get too old to reliably produce calves, they are sold for slaughter and some of the year’s new heifers are kept as replacements. It was assumed that all of the steers, all of the culled cows, and the remaining heifers would be sold. The USDA Agriculture Marketing Service web page was consulted for local livestock auction figures of what each of these classes of beef are being sold for (feeder steers, feeder heifers, and slaughter cows). It is understood that these figures change daily or weekly and it is a point-in-time estimate for comparison of alternatives. The calculations take into account an estimate of the operation’s calf crop percentage, cull rate, and weight of animals sold. The cow/calf income spread sheet calculations take into consideration that only a portion of the year is attributed to time on the NFS allotment, with the remainder of the year-round cow/calf operation being attributed to time elsewhere (private land etc). For example, the season of use proposed on the Angostura Allotment is 4 months out of 12 months, so only 4/12ths of the total gross income is attributed to time on the allotment. [41]

Alternatives A and B

Under alternative A, with no permitted livestock, no income would be generated from use of the allotment. This alternative would have the largest impact on the permittee. Under alternative B, an estimated \$14,432-\$16,055 would be the portion generated from the time livestock would spend on the allotment (4 months would be 1/3 of his operation), if 76-85 cow/calf pairs and 4 bulls are stocked.

Social Environment

The grazing operation for the Angostura Allotment is a community operation, with three permittees. When not on the Angostura allotment, the permittees use their private lands to graze their livestock. Two of the permittees also have permits to graze their livestock on other federal grazing allotments. Small-scale producers stress the importance of the quality of life that ranching provides them and their families. Owning livestock is an important way of reaffirming ties to their ancestral lands and heritage. Preserving this working relationship with the land so it can be passed on to their children, along with a feeling of self-sufficiency, is a cornerstone of their values. Generally speaking, the more rural and remote the community the more important ranching becomes. [41]

Alternatives A and B

Under alternative A the effect on the permittees would depend on how well they could adjust their operations. The permittees would have to find alternate sources for the placement of their livestock, reduce the numbers of animals in their herds, or completely cease operations. Eliminating grazing completely may also create the impression of unfairness or "taking" by the Federal government.

Continued grazing under alternative B would allow existing traditions, sense of community and personal identity to continue. The permittees would continue to have responsibility for checking up on their grazing animals and maintaining improvements on the allotment, but this investment of time and cost would generally be considered worthwhile in order to retain authorization for grazing similar numbers of livestock for a similar season in the same location. Alternative B would meet the purpose and need of contributing to the social and economic well-being of

affected livestock operators and their families, as well as to the economy of local communities and counties.

Chapter 4 - Consultation and Coordination

The Forest Service consulted the following individuals, Federal, state and local agencies, tribes and non-Forest Service persons during the development of this environmental assessment:

Federal and State Officials and Agencies

New Mexico State Historical Preservation Office (NM SHPO)
State of New Mexico Department of Game and Fish
State of New Mexico Environment Department
US Department of the Interior, Fish and Wildlife Service
US Department of the Interior, Bureau of Land Management

Local Government

Taos County Manager
Taos County Chamber of Commerce
Village of Angel Fire

Tribes

Pueblo of Jemez	Pueblo of Taos
Jicarilla Apache Nation	Pueblo of Tesuque
Pueblo of Nambe	Pueblo of Zuni
Pueblo of Picuris	The Hopi Tribe
Pueblo of Pojoaque	The Navajo Nation
Pueblo of San Ildefonso	Southern Ute Tribe
Pueblo of San Juan	Ute Mountain Ute Tribe
Pueblo of Santa Clara	Comanche Tribe

Organizations

Forest Trust	Northern New Mexico Stockman's Association
Center for Biological Diversity	Angostura de Caballo Cattle Association
Wild Watershed	Forest Conservation Council
Sierra Club Santa Fe Group	New Mexico Cattle Grower's Association
Amigos Bravos	Rocky Mountain Youth Corps
Wild Earth Guardians	New Mexico Wilderness Alliance
Carson Forest Watch	Audubon Society
Angel Fire Resort	Taos Nature Society
Sierra Club – Rio Grande Chapter	Archeological Society
Mora Land and Water Protective	New Mexico Farm and Livestock Bureau
Forest Guild	The Quivira Coalition
Sangre de Cristo Audubon	El Valle Community Association
Taos Birders	National Wildlife Federation
Sierra Ditch Commissioners	Acequia de Llano de la Llegua

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Ben Gurule
Curtis Hass
Annie Hendrie
Tony Herrera
Mary Humphreys
Peter von Klangand
Cleve Lewis
Arnold Lopez
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Sandra Miadwell
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Felix Sandoval
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Roger Badash
Dorothy Beatty
David Benjamin
Tom & Lydia Berrony
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Jeremy Campbell
Bill and Karen Chapman
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Barbara & Duke Cozart
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Jason Gisham
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Marvin Macauley
George Maestas
Henry Martinez
Pablo Martinez
Mary T. Mascarenas
Diane & Mike McFadin
Carol Miller
Jean Nichols
Charles Redditt
Joseph O. Rodarte
Kenge Ruiz
Ernesto Romero
Juan Roybal
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Chapter 6 – List of Preparers

Interdisciplinary Team Members:

Lucy Aragon	Interdisciplinary Team Leader (Social, Economics)
Karen Cook	Camino Real District Recreation Technician (Recreation)
Patricia Corral	Camino Real District Archaeologist (Heritage)
Raymundo Corral	Camino Real District Fire Management Officer (Fire, Air)
Melvin Herrera	Camino Real District Range Staff (Rangeland Vegetation)
Chirre Keckler	Forest Wildlife Program Manager (Wildlife Review)
Andrew Lang	Camino Real District Assistant Fire Management Officer (Fire)
Allan Lemley	Forest GPS Coordinator (GIS)
Juan Martinez	Forest Fisheries Biologist (Fisheries)
Greg Miller	Forest Watershed Program Manager (Soils, Water, Air Review)
Janet Moser	FS Enterprise Team Wildlife Biologist (Wildlife)
Zigmund Napkora	Forest Hydrologist (Soils, Water)

Appendix A - Project Record Index

DOC #	DATE	DOCUMENT	AUTHOR	RECIPIENT
01	1986.10.00	Final Environmental Impact Statement (FEIS) for the Carson Land and Resource Management Plan	USDA Forest Service	Public
02	1986.10.31	Record of Decision for the Carson Forest Plan FEIS	USDA Forest Service	Public
03	1986.10.31	Carson National Forest Land and Resource Management Plan, as amended	USDA Forest Service	Public
04	1987	Terrestrial Ecosystems Survey of the Carson National Forest	USDA Forest Service	Public
05	1987.03.10	Final Environmental Impact Statement (FEIS) for the Santa Fe Land Management Plan	USDA Forest Service	Public
06	1987.09.04	Record of Decision for the Santa Fe Forest Plan FEIS	USDA Forest Service	Public
07	1987.09.04	Santa Fe National Forest Land Management Plan, as amended	USDA Forest Service	Public
08	1989.07.20	Spotted Owl Survey	USDA Forest Service	File
09	1997.08	Survey of Arizona Willow on the Carson National Forest (negative results except on Luna Chacon Allotment)	Mountain West Environmental Services	Public
10	2006.04.20	<i>Salix arizonica</i> Dorn (Arizona willow): A Technical Conservation Assessment	Karin Decker, CSU	USDA Forest Service
11	2006.05.22	Request to be included on NEPA mailing list.	Nathan Small, NM Wilderness Alliance	Questa District Ranger
12	2006.11.14	Interdisciplinary Team Meeting Notes and various associated maps.	IDT Leader and GIS specialist	File
13	2007.02.23	Interdisciplinary Team Meeting Notes	IDT Leader	File
14	2007.04.02	2007 Project List for Tribal Consultation & mailing list (including Angostura Allotment)	Forest Supervisor	Tribal mailing list

Appendix A - Project Record Index

15	2007.04.30 and 05.02	Interdisciplinary Team Meeting Notes plus meeting handouts 4/30 and 5/02	IDT Leader	File
16	2007.07	Forest-wide Management Indicator Species Assessment, Carson NF (Note: 1 copy in a separate binder)	Carson National Forest	Public
17	2007.07.01	Schedule of Proposed Actions (7/1/07-present)	USDA Forest Service	Public
18	2007.07.22	Request to be included on NEPA mailing list.	Greta Anderson, Center for Biological Diversity	Carson National Forest
19	2007.10.25	Interdisciplinary Team Meeting Notes	IDT Leader	File
20	2007.11.07 and 08	Interdisciplinary Team Meeting Notes	IDT Leader	File
21	2007.12.18	Email relaying Utilization Paper/Revised Version of Principles of Obtaining and Interpreting Utilization Data on Rangelands dated 05/07 – regional guidance on usage	SW Region’s Director of Range	Forest Range Staff Officers
22	2007.12.21	Scoping Letter & mailing list	District Ranger	Mailing list (187 individuals, groups, & agencies)
23	2007.12.21	Email regarding no need to send tribal consultation due to earlier consultation.	Forest Archeologist	IDT leader
24	2007.12.23	Response to scoping letter	Benito Herrera	District Ranger
25	2007.12.28	Response to scoping letter	Joanie Berde, Carson Forest Watch	District Ranger
26	2008.01.01	Response to scoping letter	Lloyd Bolander	District Ranger
27	2008.01.11	Scoping letter	District Ranger	Mr. Jerry Yeargin
28	2008.01.11	Scoping letter and mailing list	District Ranger	Mailing list (8 individuals/ adjacent allotment permittees)
29	2008.01.16	Cover letter and mailing list for Angel Fire property owners (sending 1/11/08)	District Ranger	Angel Fire Property Owners (22 addresses)

		scoping letter and cover letter)		
30	2008.01.17	Response to scoping letter	Wallie Murphie, USFWS	District Ranger
31	2008.01.18	Tribal scoping letter & mailing list	District Ranger	Picuris Pueblo, Pueblo of Taos, Jicarilla Apache Nation
32	2008.01.21	Response to scoping letter	Erik Ryberg, Western Watersheds Project	Melvin Herrera
33	2008.01.21	Response to scoping letter	Joe Romero for Carlos Salazar, President NNMSA	District Ranger
34	2008.01.23	Interdisciplinary Team Meeting Notes	IDT Leader	File
35	2008.01.28	Response to scoping letter	Michael Scialdone, NM Wilderness Alliance	District Ranger
36	2008.02.06	Response to scoping letter.	NMDG&F	District Ranger
37	2008.02.07	ESA Section 7 Consultation and Applicant Status for Term Grazing Permit Holders and Related Involvement in the NEPA Process	District Ranger	Angostura Livestock Grazing Permittees
38	2008.02.07	History of the Angostura allotment	Permittee – Elias Hurtado	District Ranger
39	2008.02.11	Conversation log between Range Staff Melvin Herrera and Joe Romero, NNMSA	Range Staff	File
40	2008.03.11	Interdisciplinary Team Meeting Notes	IDT Leader	File
41	2008.03.25	Social/Economics Specialist Report	Natural Resource Coordinator	File
42	2008.03.28	Conversation log between IDT Leader Lucy Aragon and Erik Ryberg, Western Watersheds Project	IDT Leader	File
43	2008.03.31	Conversation log between Rangeland Management Specialist Sean Kelly and Joanie Berdie, Carson Forest	Rangeland Management Specialist	File

Appendix A - Project Record Index

		Watch		
44	2008.04.08	Response to scoping letter	NMED, Surface Water Quality Bureau	District Ranger
45	2008.06.24	Heritage Report NMCRIS No: 110163; No Adverse Effect with Concurrence from State Historic Preservation Officer	District Archaeologist	Forest Supervisor
46	2008.07.30	Range of Alternatives, District Ranger Approval	District Ranger	IDT
47	2008.08.05	Proposed Action for 30 day public comment period	District Ranger	60 groups, individuals, agencies on mailing list
48	2008.08.06	Recreation, Wilderness, and Wild and Scenic Rivers Specialist Report	District Recreation Technician	File
49	2008.08.07	Legal Notice for Comment	The Taos News	Public
50	2008.08.11	Legal Notice for Comment	Carson Web Page	Public
51	2008.08.14	Newspaper article on grazing reviews, with info on how to comment	The Taos News	Public
52	2008.08.20	Biological Assessment	Enterprise Team Biologist	File
53	2008.08.21	Prescribed Fire Analysis	Assistant Fire Management Officer	File
54	2008.08.22	Cover letter sending BA to USF&WS	Forest Supervisor	USF&WS
55	2008.09.05	Range Specialist Report	District Rangeland Management Specialist	File
56	2008.09.06	Heritage Specialist Report	District Archeologist	File
57	2008.09.08	Letters (17) received during 30 day notice and comment period dated from 2008.08.11– 2008.09.08	17 commenters, see index in project record for list of names	District Ranger
58	2008.09.10	Letter received following 30 day notice and comment period.	New Mexico Environment Dept.	District Ranger

59	2008.09.10	Interdisciplinary Team Meeting Notes (review comments received during comment period)	IDT Leader and ID Team	File
60	2008.009.13	Soil and Watershed Specialist Report	Forest Hydrologist	File
61	2008.09.18	Email from NM Environment Dept regarding Section 401 certification, including correspondence between NMED and Amigos Bravos showing past case law.	NMED	Forest Hydrologist
62	2008.09.22	Wildlife Specialist Report	Enterprise Team Wildlife Biologist	File
63	2008.09.25	Biological Evaluation	Enterprise Team Wildlife Biologist	File
64	2008.09.29	Fisheries Report/BE	Forest Fisheries Biologist	File
65	2008.09.30	Letter of Concurrence from the US Fish and Wildlife Service	USFWS Acting Field Supervisor	Forest Supervisor
66	2008.09.30	Comment Analysis for the Responses to the Proposed Action	IDT Leader & ID Team	File
67	2008.09.30	List of individuals, groups, and organizations who commented during the NEPA analysis process for the Angostura Livestock Grazing Allotment EA	IDT Leader	File
68	2008.09.30	Environmental Assessment	IDT	Public
69	2008.09.30	Decision Notice and Finding of No Significant Impact for the Angostura Allotment	District Ranger	File